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Agriculture

Forest Service

Pacific
Northwest
Region

1986

Appendices – Draft Environmental Impact Statement

COMPLETED
401

Proposed Land and Resource Management Plan

Okanogan National Forest

435
IE

ORIGINAL

12. More firewood areas
13. Camps for
14. Close
roads
15.
16. Weed control
17. Water
irrigation
18.

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APPENDIX A

ISSUE, CONCERN AND OPPORTUNITY IDENTIFICATION PROCESS

I. INTRODUCTION

This appendix is organized into three major sections covering the major steps taken to identify public issues, management concerns and resource opportunities. The first section summarizes the process used to identify issues, concerns and opportunities. It is generally in chronological order. The second section describes the contacts and consultation with others throughout the planning effort. "Others" include government agencies, the Colville Confederated Tribes, special interest groups, landowners and industries. The last section lists the criteria used to screen the issues and concerns down to the few selected to be addressed in the EIS. The issues and concerns are classified into those which are deferred for resolution outside the forest planning process; those which are treated in the same way in all alternatives; and those treated differently in the design of various alternatives.

II. IDENTIFICATION PROCESS

The public involvement process for the Forest Plan began formally on December, 1979, with a news release and press conference announcing the planning process and its intent. Formal announcements were made in the Federal Register, to the State of Washington clearinghouse, and in newspapers, radio spots and letters to the existing mailing list.

To identify public issues for consideration in the Forest Plan, two steps were taken in the spring of 1980: The forest planning team compiled a list of public issues and management concerns and forest personnel established several communication channels. Individuals were invited to attend public meetings hosted by the forest, submit written comments by personal letter or on a response form provided by the forest, come to any forest office to chat with either the resident District Ranger or the Forest Public Information Officer, or telephone comments to the Public Information Officer. Primary emphasis, however, was given to attendance of the public meetings.

The public was urged to attend one of the nine scheduled public meetings and request their name be placed on the Forest Plan mailing list. This was done through a combination of paid newspaper and radio advertisements, news releases, press contacts, a radio "call-in" program, a forest plan newsletter, and extensive personal contact with key people in traditional and nontraditional publics for the forest.

Three additional meetings were held for forest employees to voluntarily attend to offer their concerns and issues.

A. Meetings

Meeting sites and attendance figures are listed below. All meetings were held in Washington State.

TABLE A-1: PUBLIC ISSUE MEETINGS

Public Meeting	Attendance	Date
Okanogan	128	05/06/80
Winthrop	372	05/08/80
Oroville	51	05/13/80
Tonasket	107	05/15/80
Brewster	27	05/19/80
Chelan	30	05/20/80
Nespelem*	8	05/22/80
Republic	16	05/27/80
Seattle	206	06/05/80
Total	945	

*Recovering from Mt. St. Helens ash fallout.

TABLE A-2: FOREST SERVICE MEETINGS

Employee Meeting	Attendance
Okanogan (included Supervisor's Office, Tonasket and Conconully Ranger Districts)	63
Twisp Ranger District	43
Winthrop Ranger District	30
Total	136

All meetings followed the nominal or small group approach [see Forest Service Inform and Involve Handbook (Draft), pages 157-158].

General public participants were asked to sign a log sheet documenting their attendance. Most did so. For all meetings, introductory remarks by forest personnel welcoming participants, and a brief explanation of the planning process and purpose were given. The importance of individual participation was stressed. Participants were encouraged to submit written remarks in the days following the meetings, should they later want to add to their comments made at the meeting. The meeting body was then divided into small groups led by a forest employee trained as a facilitator in the nominal group process.

A work sheet was given each participant on which to list and give priority ranking to issues and concerns they individually wanted forest managers to consider in developing the Forest Plan.

At the 9 public meetings, there was a total of 67 groups, with an average of 14 people per group facilitator. The range of group size was from 4 (Nespelem) to 19 (Winthrop).

A total of 24 people served as facilitators, some being at only one workshop, others being at most. Three people from the Pacific Northwest Region, Office of Information, and two from the Mt. Baker-Snoqualmie National Forest, Office of Communication, aided forest personnel at the Seattle meeting.

B. Written Responses

Over 2000 copies of "Forest Plan Report," number 2, dated May 1980, and including a response form and business reply envelope, were mailed to the Forest Plan mailing listees. Recipients of the newsletter were strongly encouraged to attend the aforementioned public meetings, rather then submit the response form.

TABLE A-3: PUBLIC RESPONSE

	Issue Statement
9 Public Meetings	2663
Public's personal letter and response forms	2354
3 Forest employee meetings	603
Total	5620

The forest planning team evaluated and summarized the public's comments during the summer of 1980. This summary was released to the public via a forest plan newsletter to confirm the team's evaluation and summary. Few comments were received in response to the newsletter.

The forest released a draft Environmental Impact Statement in August of 1982. Four open house meetings were held in September and October 1982 to provide information or answer inquiries about the DEIS. These meetings were held in conjunction with the Early Winters Alpine Winter Sports DEIS issued at the same time as the Forest Plan DEIS. The open house meetings were held at Okanogan, Tonasket, Seattle and Winthrop. Attendance for all the meetings was in excess of 300 individuals.

Response to the DEIS was voluminous. Over 700 people responded in writing. Over 400 of the many comments were substantive and, therefore, needed addressing in the final EIS. The planning team evaluated. Several new issues or aspects of issues not previously emphasized by the public materialized. These topics were added to the list of major public issues.

Several related developments were taking place about the time the DEIS was issued, the public responded and the forest was evaluating those responses. Those developments led to the need for the Okanogan National Forest to restructure its planning analysis and publish a new draft EIS. Specifically, those developments were the issuance of revised planning regulations by the Secretary of Agriculture (September 1982), the development of new analysis criteria by the Forest Service to address concerns expressed by the Secretary's office about National Forest Planning (May 1983), and the Secretary's decision mandating each National Forest to re-evaluate undeveloped areas for possible wilderness designation (direction from the Secretary's office in March 1983).

In July 1984 Congress passed the Washington Wilderness Act of 1984 which added small areas to the Pasayten Wilderness, created the Lake Chelan/Sawtooth Wilderness and created the North Cascades Scenic Highway. The net result of the actions from 1982 through 1984 was to profoundly change the management situation of the Okanogan National Forest.

In the fall of 1984 a planning newsletter was mailed to all people on the forest mailing list. This newsletter listed all the major public issues, including those raised in response to the draft EIS, and asked for comment. Little comment was received.

III. CONSULTATION WITH OTHERS

A. Consultation with Other Agencies

The following federal and state agencies were contacted to request consultation during the planning process:

1. The Environmental Protection Agency

The EPA reviewed the previous draft EIS December 1982. They had "no specific concerns regarding adverse impacts which may result from implementation of the plan."

2. Colville Confederated Tribes

In addition to the public workshop held in Nespelem in 1980, annual meetings have been held with the tribal leadership to keep them informed of forest planning activities and to gain an understanding of their perspective about resource managment problems. Issues, indicator species, management strategies and standards and guidelines were discussed with the CCT Director of Fish and Wildlife Department. The same department responded in memorandum to the first DEIS.

The CCT was also contacted by memo in January 1983 regarding possible location of sites of religious significance to the Colville Confederated Tribes under the American Indian Religious Freedom Act of 1978. None identified on the Okanogan Forest.

In July 1985, the CCT shared their draft multi-resource plan with the Forest Service. Although at this time they do not have a scheduled time to issue a final, the draft reflects their current plans.

3. Washington State Parks and Recreation Commission

Contacted by memo in November 1983 regarding plans of Washington State Parks and Recreation to conduct Wild and Scenic River Studies on the Chewuch, Methow and Twisp Rivers which are considered "Rivers of State-wide Significance." Numerous telephone and written contacts over the past six years regarding concerns relating to winter sports activities on the forest.

4. Interagency Committee for Outdoor Recreation

Numerous telephone contacts since 1983 regarding the relationship of Okanogan National Forest recreation opportunities with the goals and objectives of the Washington Statewide Outdoor Recreation Plan, 1979. Discussed concerns about the impacts of the Okanogan Forest Plan as they relate to trails reconstructed with State ORV funds.

5. North Cascades National Park

Numerous telephone and written contacts over the past six years regarding plans for the relocation of the Pacific Crest National Scenic Trail over Maple Pass. Also numerous discussions by telephone, in written correspondence and in person, regarding the goals and objectives of National Park and National Recreation Area Management in relationship to Okanogan National Forest management adjacent to the park and NRA's. They also responded to the DEIS.

6. U.S. Fish and Wildlife Service

A detailed set of recommendations was received from this agency in October 1982. The area manager in Olympia was consulted during June 1982 about issues, indicator species and formal consultation requirements.

7. U.S. Bureau of Mines

This agency provided mineral potential information and responded to the first draft EIS.

8. National Marine Fisheries Service

This agency responded to the first DEIS and provided valuable information not known by the planning team until that date.

9. Bureau of Land Management

The agency exchanged long range plans for adjacent and nearby lands with forest.

10. Soil Conservation Service

The local district conservationist was kept informed through monthly meetings with the County Conservation District, during 1981. Since then annual updates have occurred. The Washington State office responded to the first DEIS in November 1982.

11. State of Washington Department of Transportation

This agency responded to the first DEIS and made a recommmendation.

12. State of Washington Office of Archaeology and Historic Preservation

This agency responded to the first DEIS and made a recommendation.

13. State of Washington Department of Game

With the Okanogan County office and the Ephrata Regional office, numerous meetings over the past four years have taken place with particular topics of issues, indicator species, inventory data, alternative goals, units of measure, management strategies, and standards and guideline. This Department wrote a lengthy memorandum outlining its desires for the management of the Okanogan National Forest, in response to the first DEIS in 1982.

14. State of Washington Department of Fisheries

Meetings with the Yakima office personnel concerning issues, inventory data and the AMS have taken place over the past few years.

15. Washington State Department of Ecology

This department suggested changes to the "Affected Environment" chapter of the first DEIS.

16. Washington State Department of Natural Resources

This agency was consulted for their long range land management plans. They also reviewed the 1982 DEIS without comment.

17. Okanogan County Conservation District

This government body was kept informed of the planning activities and asked to comment on the 1982 DEIS, which they did.

B. Consultation with Interest Groups

The planning process has dictated involvement with numerous government agencies and special interest groups. This section chronicles the history of the Okanogan's consultations with interest groups.

Beginning in January 1983, the Okanogan Forest scheduled frequent sessions to meet in small informal groups with a variety of interest groups to discuss Forest Planning and other items of current interest. Typically, the groups were composed of individuals and organizations with similar objectives and concerns, such as conservation groups, timber industry and others.

Meetings have been held approximately quarterly with a coalition of leaders and members of Seattle-based conservation groups. Groups represented include the Sierra Club, Audubon Society, Wilderness Society, North Cascades Conservation Council, Washington Wilderness League, Washington Environmental Council, Friends of the Earth, Native Plant Society, Mountaineers, and possibly others. These meetings have been held in Seattle, at the Mountaineers Clubhouse. Forest Planning has been an agenda item at each of the meetings. These contacts have included essentially all phases of the process including ICO's, inventory information, management strategies, and concluding with the development of a complete alternative which represented a consensus of their groups (but not necessarily representing the viewpoint of any individual group due to their diversity). They also developed a specific management strategy for the North Cascades Scenic Highway that is one of three being modeled by the Okanogan Forest. Attendance at the meetings has ranged from 12-30 participants, with varying representation from the Okanogan management team. Typically either the Forest Supervisor or one or more District Rangers has attended.

The timber industry groups have participated in several office meetings and also field trips. Representation was from local purchasers and industry associations including Northwest Pine Association and Western Forest Industry Association. The office meetings dealt with process, issues and concerns, inventory information, scheduling and management strategies. Field trips keyed primarily on suitable land classification and mapping, and economics. Additionally, there have been frequent office visits and telephone consultations with the Northwest Pine Association representative on detailed modeling information.

Forest personnel have contacted the Northwest Mining Association (NWMA) on a regular basis throughout the planning process. The Executive Director has met and had phone conversations concerning planning updates and requests for minerals information many times during the 1985 calendar year.

Local conservation-oriented individuals have also participated in informal group meetings similar in format to those in Seattle. There have been five of these meetings, which have been attended by from 5-15 individuals. These people are largely unaffiliated, but some represent the Washington Department of Game, Okanogan Wilderness League, and Sierra Club. Four of the meetings were in Okanogan, one in Twisp. The Forest Service has provided transportation to these meetings for groups coming from Oroville/Tonasket to Okanogan, and also to Twisp from Okanogan. Similar Forest Planning topics were discussed in these meetings as the other two groups, but interest tends to be more on Early Winters ski area and other local issues.

One presentation was made to the North-Central Washington Sportsman's Council, a coalition of representatives from various hunter/fisherman groups in this area of the state. It was attended by approximately fourteen representatives, and dealt with the relationship of the Forest Plan to Early Winters, Plan process, schedule and ICO's.

Documentation of these contacts is contained in the Planning Records maintained in the office of the Okanogan National Forest Supervisor.

IV. SELECTED ISSUES, CONCERNS AND OPPORTUNITIES

There are three major subjects covered in this section:

(a) identification of the major issues, concerns and opportunities which drove this analysis.

(b) the screening process used to narrow the scope of the issues, concerns and opportunities to those selected to be addressed in this EIS.

(c) classification of issues by their way of resolution.

The major issues and concerns which drove the planning process are identified in Chapter One. The complimentary and conflicting relationships among resources within and between issues are addressed in depth in Chapter Three, as are the resource use and development opportunities.

A. Screening Process

As explained earlier, the identified public issues and management concerns evolved. The criteria evolved too. Initially, in 1979, several sources were examined for public issues and management concerns; previous public responses to unit plans, the planning team's knowledge (from appeals, etc.), and adjacent forests' lists. These topics were checked to see if each topic meets the definition of an issue or concern. If one didn't, it was rejected; if it did, it was checked against the following five criteria listed in the draft FSM 1920. The NEPA criteria of intensity and widespread concern were not used with this preliminary identification of issues and concerns because the planning team didn't have a good measure of either at that time.

The criteria are:

1. Feasibilty test: can the National Forest deal with the topic, considering scope, laws and technology?

2. Planning test: topic must deal with land use in terms of allocation of the land to one or more emphases, scheduling of resource outputs and/or activities and/ or management guidance.

3. Planning regulations test: topic must not be wilderness designation.

4. Scope: the extent of the issue or concern should be more than an isolated case but be appropriate to the Okanogan National Forest.

5. The topic is not already resolved elsewhere.

This initial list of public issues and concerns was then sent to the public and forest employees in the spring of 1980 along with the screening criteria. The public and forest personnel were then asked to develop their own lists of issues and concerns, as per the process described above.

The planning team then evaluated the 5000 topics given them by the public at nine workshops and in 400 personal letters. It became apparent that many similar concerns were expressed, though with different words, so those topics of similar nature and wording were organized together. All topics raised in either a meeting or in a letter were considered valid if a signature and mailing address were included. A definition of widespread was decided upon to be more than 25 respondents to a topic. No attempt was made to screen duplicate responses. If the topic was a regional issue (R6 plan) and applicable to the Okanogan National Forest it became an issue for the Forest Plan regardless of any support or lack of support it may have received at the workshops and letters.

With no exceptions, all the preliminary topics were identified either individually or as part of broader issues by the public. Almost without exception the public's choice of wording was different than those used to describe the preliminary issues and concerns. As a result, the issues were reworded to conform with the public's choice of words.

In the fall of 1982 the public responded to the DEIS issued by the forest in August of 1982. Using the same criteria several "new issues" were identified. Several hundred substantive comments were sent in too, but these were mostly process questions. The implied issues were covered by the list generated by the public in the 1980 meetings and those listed below. The new issues are:

> "What rivers should be designated as wild and scenic rivers?"
>
> "Will timber be harvested where harvest is not economically efficient?"

In addition, the public expressed much more concern about wildlife habitat. As a result four separate wildlife issues are recognized which replace the single, broadly stated wildlife issue stated by the public previously.

These updated issues and concerns were sent to the public in the fall of 1984 to verify that the list still covers the major, widespread public issues. The public did not identify any new major public issues at that time.

And lastly, in order to call attention to the lodgepole pine concern and all the interlocking consequences of managing and not managing the Meadows area of the forest, this management concern is added, "How will Lodgepole pine stands be managed?"

B. Issues and Concerns

The major issues and concerns at the time of this writing are listed below. Those issues and concerns that are preceded by an asterick are the drivers in alternative formation. The quantified indices of these ICOs are given in Table II-1 (DEIS).

1. Soil, Water and Air

a. How Will Ecosystems and Environmental Quality be Protected?

The public emphasizes the protection of the environment in general, including air quality, water quality and the soil resource.

b. How Will Riparian Areas be Protected?

Most comments stress protection of these areas from logging and grazing, with emphasis on maintenance of water quality and the riparian ecosystem. Some members of the public are particularly concerned about protection of riparian areas for wildlife, because wildlife tend to concentrate in these areas. In contrast, some people commented that current restrictions on logging in riparian areas are too rigid, and that these areas should be more intensively managed.

2. Mineral Development

a. What Mineral Resource Activities Will Be Encouraged?

Most comments centered around concern over large areas of surface disturbance, such as open pit mines, although comments ranged from the desire to extract all minerals to the desire to prohibit mining altogether.

Miners express the desire that easy access be provided for mining activities.

3. Fire

a. How Will Fire Be Managed?

Some people reject the policy of allowing forest fires to burn out naturally in certain areas, particularly in the wilderness; some people support the policy.

4. Roads and Access

a. How Will the Okanogan National Forest Roads be Managed and Access to the Forest be Provided?

The public's emphases are on road construction, maintenance, and the location and amount of roads. Many people feel that roads are currently being built to standards that are too high for the intended use. Other comments centered around new road construction; some people want more access provided; others want no new roads built.

The public is also concerned about access to the Okanogan National Forest, with some people expressing a need for restricting access and some objecting to restricted access. The majority of comments objecting to road restrictions were in reference to loss of firewood cutting opportunities, while those advocating road closures wanted better wildlife protection or better quality hunting and fishing experiences.

5. Wilderness

a. How Will Wilderness Areas Be Managed?

The public expresses concern over conflicts between range and recreation uses, with concerns centered around visual impacts of grazing. Some people feel their recreational experience is lessened if they see cattle and sheep or the effects of their presence in the wilderness.

People have also expressed concern over the building of dams in the wilderness.

7. Roadless Areas

a. How Will the Okanogan National Forest Manage Roadless Areas?

The public is concerned with how the remaining roadless areas will be managed. Specific areas of widespread interest are Tiffany, Beaver Meadows, Okanogan Highlands and Golden Horn. Some people feel that these areas should be managed as de-facto wildernesses, or allocated to unroaded recreation. Some people feel that timber management within these areas should proceed.

8. Timber Management

a. What Is the Appropriate Timber Harvest Level?

Most comments express concern that the forest be managed on a sustained yield basis. Many people comment that the forest should maximize timber yield. Issues raised by the public are split between concerns over loss of jobs if a low harvest level is established, and concern about impacts to wildlife, visuals and other resources if a high harvest level is established.

b. How Will Wood Waste Be Utilized?

Most comments emphasize the desire for utilization or clean-up of slash following timber sales and thinnings. Fuel or firewood cutting and chipping are most often mentioned for slash utilization. Most people feel that burning slash is wasteful. A strong desire for more firewood cutting opportunities was expressed. Some people also mention that snags should be protected for wildlife habitat.

c. Which Silvicultural Treatments Will Be Used?

Some people favor selective cutting (a form of uneven-age management) rather than clearcutting (a form of even-age management). These comments stress the desire to maintain variety and not create a forest "monoculture." Other people emphasize the need to reduce logging costs through the use of even-age management. Many people are concerned about reforestation success after logging and urged planting to ensure regeneration.

d. Which Logging Methods Will Be Used?

Several comments received favor the use of horse or helicopter logging. Reasons for preference of these systems were not given, but the probable reasons are because these systems cause less site disturbance.

e. How Will Lodgepole Pine Stands Be Managed?

This is mainly a management concern, except that lodgepole pine management relates to many other issues discussed in this section, such as roadless, lynx habitat and timber management costs. The large lodgepole pine stands are mainly located in roadless areas and currently provide haitat for declining lynx populations. Costs of developing access and harvesting in some stands may exceed the value of standing timber. Consideration of using prescribed burning should be made.

8. Range Management

a. What Is the Appropriate Level of Grazing on the Forest?

Some people feel there are currently too many restrictions on grazing, and want current levels of grazing maintained. Others feel that grazing should be further restricted or prohibited on National Forest System lands.

9. Threatened, Endangered and Sensitive Species

a. How Will Threatened, Endangered or Sensitive Animals Be Managed and Affected?

The public is concerned that species such as the grizzly bear, bald eagle, peregrine falcon, wolf and spotted owl be protected. Concern is expressed that populations, habitat and effects on these species be estimated and displayed, because opportunities to improve habitat may exist.

Forest personnel are concerned about the recovery of the grizzly bear and peregrine falcon and the management of the northern spotted owl.

10. Research Natural Areas

a. How Can the Okanogan National Forest Help Meet Identified Needs of the Research Natural Area Program?

Many people have expressed the belief that both the Maple Mountain and Tiffany Mountain areas should be managed as Research Natural Areas.

11. Wildlife Habitat Management

a. How Will the Okanogan National Forest Ensure the Maintenance of Big Game Populations?

Public and forest personnel indicate that timber, recreation and range management have resulted in difficulties in maintaining big game populations, which include mule deer, white-tailed deer, bighorn sheep and mountain goats.

A major concern expressed is the belief that timber management activities have reduced the amount and quality of cover for deer, especially in low elevations where road access is easier and timber management is more economical. Also of concern is the distribution of forage and cover on the forest.

Increasing recreation access to big game winter range and travel corridors is of major concern to many people, as are conflicts between big game and livestock grazing.

Many people expressed concern that management direction will only maintain minimum big game wildlife populations rather than optimum or desirable wildlife levels.

b. How Will the Okanogan National Forest Provide Habitat for Small Game and Non-Game Wildlife Species?

The public is concerned that timber management results in conflicts with maintenance of viable small game and non-game wildlife populations, for the same reasons listed in the big game issue above.

Concern is expressed that wildlife trees, including snags and down material (logs), are imperative to the maintenance of many non-game wildlife species.

XX

Again, the public expresses concern that management direction will maintain only minimum small game and non-game wildlife populations rather than optimum or desirable wildlife levels.

Many people are concerned that timber harvest within the lodgepole plant association may adversely affect species dependent upon both that ecotype and plant communities found within the lodgepole areas, especially the lynx.

The maintenance of old growth is of particular concern to the public because many wildlife are dependent on this ecosystem.

c. How Will the Okanogan National Forest Provide Habitat for Anadromous Fish and Trout?

The general public, the Colville Confederated Tribes and the State of Washington, Departments of Fisheries and Game express concern about fish populations. Concern focuses on the effects of timber management, sedimentation and increased recreation access upon fisheries.

12. Economics

a. How Can the Okanogan National Forest Increase Economic Efficiency?

People define economic efficiency differently; some people want decreased government costs and some want increased service for current costs. Some people want decreased logging costs in order to increase private business profitability. Others want increased receipts to the U.S. Treasury and to Okanogan County. One particular concern raised is for the cost efficiency of uneven-age timber management, as opposed to even-age timber management.

b. Will Timber Be Harvested Where Harvest Is Not Cost Efficient?

This issue has become increasingly important to many people, especially in management of marginally productive lands, where the costs of timber management can exceed returns to the U.S. Treasury from timber stumpage. Many comments favor harvesting timber only where timber receipts are greater than costs.

c. What Will Be the Economic Effects Upon Local People?

Many comments from the public express concern that the Forest Plan not result in the loss of jobs, and that the Plan, if possible, increase commodity production to increase the amount of jobs. Most people commenting on this issue want the timber harvest level either maintained or raised to maintain the current level of jobs or create new jobs.

13. Social

a. What Will Be the Social Effects on Local People?

Local residents express concern about the effect that the Forest Plan would have on the quality of life. Air quality, wildlife, water quality, population levels, recreation and jobs are some of the quality of life issues which the Forest Plan can affect that are important to these people.

14. Recreation

a. How Will the Okanogan National Forest Provide for Winter Recreation Opportunities?

The public expresses the desire for management direction regarding ski touring, cross-country ski trails and snowmobiling, especially in the Methow Valley area. The concern is over providing for both cross-country skiing and snowmobiling within the same areas. People also express concern over conflicts between snowmobiling and logging traffic on groomed and/or marked snowmobile routes.

People also desire additional parking and shelters.

b. How Will the Okanogan National Forest Provide for Off-Road Vehicle (ORV) Use While Maintaining Other Recreation Opportunities?

During public involvement some people expressed concern over the lack of existing ORV opportunities, while others wanted ORV use further restricted or prohibited on the the forest.

c. How Will the Okanogan National Forest Provide for a Variety of Recreation Opportunities?

The majority of comments regarding this issue emphasize the desire to continue providing a full spectrum of recreational opportunities, from highly developed to primitive.

The majority of the people who mentioned facilities management want existing campground and trails maintained, and many would like to see additional facilities and trails provided. Many people express concern that trails are not maintained, signed or mapped adequately.

15. Scenery

a. What Emphasis Will Be Given to Scenery?

The public expresses concern that the corridors along existing major roads and highways be managed to maintain scenic quality. The Chewuch River corridor is most often mentioned for retention of scenic values.

b. How Should the North Cascades Scenic Highway Be Managed?

Most public input regarding the North Cascades Highway area was received before the North Cascades Scenic Highway was established by Congress. Therefore input was given as a general "scenery" issue, which is explained above. Comments received subsequent to the establishment of the highway range from the feeling that no activities should occur, to the feeling that existing scenic values can be maintained while permitting timber harvest, mineral exploration and roading activities.

16. Wild, Scenic and Recreation Rivers

a. What Rivers Should Be Designated As Wild and Scenic Rivers?

Many people support protection of the wild, scenic and recreation values of the Methow, Chewuch, Twisp, Lost, Pasayten and West Fork San Poil Rivers, and Wolf Creek.

17. Cultural Resources

a. What Protection Will Be Given to Historical Sites?

The public generally expresses the desire to preserve historical sites within the wilderness and backcountry areas, and in particular cabins in the Pasayten Wilderness. Forest personnel are concerned that the presence of cabins is concentrating people in the vicinity of the structures and resulting in degradation of the vegetation and soil in the area. The public would like to see the cabins retained for aesthetic and historical reasons and for use by recreationists.

18. Multiple Use

a. How Will Multiple Use of the Okanogan National Forest Be Provided?

The public expressed the desire for a variety of resource uses on the forest, and most of the people mentioning this issue indicated a desire for more development. The many reasons given for support of "multiple use" indicate an association with commodity uses and the increase of or impact on employment levels. Other reasons given for support of "multiple use" state specifically that other resources should be given as much consideration as timber production or recreation.

19. RPA

a. Will the Okanogan National Forest Be Able to Simultaneously Meet All RPA Targets?

Forest managers are concerned that the targets assigned in the 1985 to 2030 Resources Planning Act DEIS are unreaslistic to meet, *simultaneously*. Each target by itself can probably be met. But targets such as increasing deer numbers and increasing the timber harvest may not be simultaneously attained.

C. Opportunities

Resource opportunities are identified by the Forest Service. These follow:

1. Water

The opportunity for augmenting summer low flows by impoundment development exists. While it is not the direct responsibility of the Forest Service to develop these sites, the Forest Service would play an active role in assessing the benefits and potential impacts associated with development.

Existing runoff represents the natural capacity for annual waterflow from the National Forest. It is not likely that vegetative manipulation would provide a dependable increase in annual runoff. Timber production sites are generally droughty part of the year, and any increase in water availability created through removal of trees is quickly consumed by remaining vegetation. Timber removal at the higher elevations generally contributes little additional water because growing seasons are short and cool, and water use by removed vegetation constitutes only a small part of the total runoff from the area (Satterlund 1972).

The most practical means to significantly augment summer low flows is through development of storage reservoirs. Several sites have been identified on the National Forest as suitable for impoundment development (U.S. Geologic Survey and Okanogan County Conservation District); however, development is not currently done by the Forest Service. The Forest Service has responsibility to oversee any development on National Forest System Lands, however.

2. Soils

Approximately 200 acres of soil resource improvement is completed annually on the National Forest. This consists mostly of grass seeding to control erosion on logging skid trails, landings and access roads.

3. Minerals

There is an opportunity to maximize mineral accessibility on Forest lands, providing low access restrictions on 121,000 acres of high, 194,000 acres of medium-high, and 181,000 acres of medium mineral potential lands.

4. Air Quality

Reduction of the level of Total Suspended Particulates produced from prescribed burning on the Okanogan National Forest is possible by the manipulation of the season of burn, more spring buring which consumes less of the available fuel, removal of the heavier woody residues from the site prior to burning, thereby making them more readily available to firewood gatherers. Other opportunities may be possible through the identification of new potential markets for previously unutilized wood residues from timber sales and timber stand improvement projects. An incentive system must be developed to allow potential purchasers to make a profit from this wood resource. Currently no such incentive systems nor markets exists on the Okanogan National Forest.

5. Lands

There are several tracts of lands of other ownership inside the National Forest, which, if acquired, would reduce the cost of managing the National Forest by reducing the need for boundary surveys and road rights-of-way, possibilities of encroachments, and requests for use of National Forest lands. The Okanogan National Forest is now discussing two exchanges: one with Crown Zellerbach which includes about 3,000 acres, and another with the State of Washington which includes nearly 12,000 acres.

Completing the Forest Plan will help determine needed access routes serving the Okanogan National Forest. Acquistion of easements for these routes prior to the land's subdivision should be much simpler and less costly.

Current permitted uses of National Forest lands may not be serving their original purpose and may no longer be needed. Those uses that are no longer necessary or where the land has a greater public use should be terminated. Applicants for new uses should be required to demonstrate their need to use National Forest lands prior to granting that use.

The Small Tract Sales Act of January 12, 1983 (P.L. 97-465; Stat 2535) permits the Forest Service to sell to qualified individuals certain small tracts of land which are not in the public's interest to keep as National Forest.

Land and Water Conservation Act funds may be used to buy important recreational lands for National Forest purposes.

6. Roads

The opportunity to identify short and long-term Okanogan National Forest land and resource management objectives in the Forest Plan will provide the base from which plans to construct, maintain and operate the National Forest transportation system can be made. The spectrum of opportunities, goods and services provided by the transportation system to meet those objectives, such as timber production and harvest, firewood gathering, all types of recreation, minerals, range, etc., will define where roads should or should not be constructed/reconstructed, kept open or blocked, and what standard a road should be.

7. Wilderness

No additional acreage shall be considered for wilderness designation during this planning cycle. The Washington State Wilderness Act of 1984 determined that with respect to national forest system lands in the State of Washington reviewed during RARE II, "that review and evaluation or reference shall be deemed for the purposes of the initial land management plans to be adequate consideration of the suitability of such lands for inclusion in the National Wilderness System and the Department of Agriculture shall not be required to review the wilderness option prior to the revision of the plans".

At such time as this initial land management plan for the Okanogan National Forest is revised, the wilderness option shall be reviewed for those lands remaining unroaded and suitable for wilderness classification (refer to Chapter II, Table II-3a and Appendix C for the acres and specific areas which will remain suitable for wilderness classification).

There is an opportunity to differentially manage both the Pasayten and Lake Chelan/Sawtooth Wildernesses while still meeting the requirements of the Wilderness Act (i.e. some areas can be managed as trailless, other areas can be managed with limited trails, and other other areas can be managed with a fully developed trail system capable of handling higher use levels.

8. Timber

Opportunities exist to bring vast acreages of the lodgepole pine type under management. Lodgepole pine management can make a major contribution to the total amount of wood produced on the National Forest.

In all timber types, a large amount of less than sawlog size material is available for energy production, pulp and fiber products, and home use fuelwood. Natural and catastrophic tree mortality, precommercial thinning, commercial harvests, and site preparation for reforestation are all sources of material. Development of local markets for small size material is of particular importance to management of the lodgepole pine type. Many lodgepole pine stands are stagnated and are unlikely to attain sufficient size to sell

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with current manufacturing technology. These stands may be cleared, and young, vigorous stands may be established in their place. Precommercial thinning in young lodgepole pine stands can be done to insure trees will attain usable sizes.

Existing, poorly stocked, diseased mixed conifer stands that have low volume and have little prospect for acceptable growth may be regenerated to young vigorous stands.

Opportunities exist to use prescribed fire to accomplish silvicultural objectives of site preparation, disease control and stocking level control.

9. Range

Increased forage production can be realized through utilization of transitory range created by timber harvest activities. Production measurements by forest range personnel have indicated significant increases in short-term forage production on Okanogan Forest timbered ranges upon removal of overstory vegetation.

Reduction of streamside damage from livestock may be accomplished through stock management practices which help disperse animals or direct them from these riparian areas. These practices include stock riders, use of barriers, watering, salting and more intensive range management methods.

Prescribed fire is a valuable tool for improving range forage. It is used to remove old, unpalatable forage which in turn adds nutrient to the soil. Another use is to remove or reduce debris from logging or timber stand improvement projects that hinders livestock movement to forage.

10. Wildlife and Fish

There is an opportunity to increase mule deer winter range quality on the National Forest. Thermal cover can be maintained where it is naturally limiting and increased where timber management activities have resulted in less than optimum levels. The high amount of vital deer winter range (see Wildlife and Fish SUPPLY section), which is increasing in importance due to off-forest development, can benefit from carefully designed timber and access management.

The opportunity exists to identify and manage certain timber stands for old growth habitat to maintain required levels and optimize the dispersal of old growth on the National Forest.

Overall wildlife habitat quality can be enhanced through consideration of forest-wide habitat diversity, implementation of site-specific habitat improvement projects and development of management direction for protection of special and unique wildlife habitats such as cliffs, snags and riparian zones.

Prescribed fire can be used to benefit wildlife habitat on deer winter ranges with bitterbrush, in bighorn sheep and mountain goat habitats, and to supplement aspen regeneration if funding is available.

Wildlife habitat diversity can be increased, especially for lynx and snowshoe hare populations, through carefully designed timber and access management in the lodgepole pine type.

11. Recreation

Several major opportunities are present for enhancing the National Forest's recreation resource.

The wide variety of uses and activities that are possible provides a broader spectrum of outdoor recreation opportunities than now exist. Winter sports activities can expand greatly.

Numerous potential campground sites have been inventoried and are available for development as demand dictates.

Development of a four-season destination resort at Early Winters will help meet state-wide downhill ski demand. Visitor information services can be expanded, particularly along the North Cascades Scenic Highway, Hart's Pass and in the 5-Lakes area.

12. Visuals

Several opportunities for maintaining and enhancing the visual resource are present on the National Forest.

Unmanaged stands of lodgepole pine can be managed to increase visual variety.

Timber harvest can be scheduled over time to better maintain desired visual quality levels.

Timber harvest can be utilized to enhace scenic qualities along travelways.

Some opportunities exist for rehabilitating areas which do not meet desired visual quality levels.

13. Wild, Scenic and Recreation Rivers

The National Forest has the opportunity to recommend that certain sections of eligible rivers which cross National Forest lands be added to the National Wild and Scenic Rivers System.

V. DISPOSITION

The following table distinguishes among those issues, concerns and opportunities which are:

(a) Deferred for resolution outside the forest planning process.

(b) treated the Same way in all alternatives through standards and guidelines.

(c) treated differently in the design of various Alternatives.

TABLE A-4: ISSUE AND CONCERN RESOLUTIONS

ISSUE TOPIC	DEFERRED	SAME	ALTERNATIVES
Environmental Quality			x
Riparian		x	x
Minerals		x	x
Fire Management		x	x
Roads and Access		x	x
Wilderness Management			x
Roadless Areas			x
Harvest Level			x
Wood Waste		x	x
Silviculture	(4)	x	(4)
Logging Methods	(4)	x	(4)
Lodgepole Management			x
Grazing Level	(6)		x
Research Natural Areas			x
Big Game Populations			x
Small Game & Non-game	x	x	x
Fish		x	x
T & E or Sensitive		x	
Economic Efficiency			x
Timber Harvest Economics	(7)		x
Social Effects			x
Winter Recreation			x
ORVs	(1)		x
Variety of Recreation Opportunities			x
Scenery			x
North Cascades Scenic Highway		(2)	x
Wild and Scenic Rivers	x		(3)
Protection of Historical Sites		x	
Multiple Use			x
RPA Targets	(5)		x

(1) Although this planning process will identify ORV areas, a decision may be made outside this planning process to seasonally close specific trails or areas for resource protection.

(2) The Washington State Wilderness Act of 1984 established the management intent of the North Cascades Scenic Highway. The Act directed the Forest Service to establish more specific direction through the forest planning process.

(3) Wild and Scenic River recommendations are deferred to further planning but recommendations for further study are made by alternative.

(4) Direction is established for all alternatives in the forest-wide standards and guidelines. Also, direction is established for silvicultural systems and and logging method by alternative, based on the goals of the alternative and the lands selected to meet those goals. However, project silvicultural and logging decisions are deferred until site specific environmental analyses can be made.

(5) Although the alternatives address most RPA targets, some are budget associated decisions.

(6) Grazing levels for any one area will be decided through the Range Allotment planning process. Estimates of probable grazing levels for the forest will be made for each alternative.

(7) The planning process will identify those lands on which expected costs exceed expected net returns to the treasury. This is based on average economic conditions projected into the future. At any one time the situation could be different and, therefore, the resolution of the issue would be resolved differently according the market conditions. In many instances costs exceed revenue because of efforts to concurrently produce ammenity values.

VI. ISSUES AND CONCERNS OUTSIDE FOREST PLANNING PROCESS

Several other major issues and concerns either already were or will be decided outside the forest planning process. These topics are:

A. Loup Loup Ski Bowl - The ski bowl operates under a special use permit which will be reviewed on a periodic basis.

B. Early Winters Development - This issue is addressed by a separate Environmental Impact Statement. The Record of Decision was signed by the Regional Forester on July 5, 1984, and called for development of a Winter Sports Site on approximately 3900 acres of land called Sandy Butte. The permitted facilities could serve 8200 skiers-at-one-time. For the purposes of this planning process, the issue has been resolved, though the EIS is under administrative appeal.

C. Helicopter Ski Permits - Individual permits will contine to be issued on case-by-case basis, but within direction of the Forest Plan. Direction could be established to prohibit heleicopters in certain areas during certain times - to protect surface resource values.

D. Archaeological Sites - Protection of archaeological sites is required by law. Specific disposition of any one site is deferred until site evaluation.

E. Develop Wilderness - Timber harvest, additional grazing and general public motorized access in the wilderness are prohibited by the Wilderness Act of 1964. This Act provides for the continuance of grazing use that was occurring at the time the wilderness was established.

F. Wilderness Designation - The current wilderness areas were established by law. No addtional acreage shall be considered for wilderness designation during this planning cycle. The Washington State Wilderness Act of 1984 determined with respect to National Forest System lands in the State of Washington reviewed during RARE-II, "that review and evaluation or reference shall be deemed for the purposes of the initial land management plans to be adequate consideration of the suitability of such lands for inclusion in the National Wilderness Preservation System and the Department of Agriculture shall not be required to review the wilderness option prior to the revision of the plans."

G. Mining - The U.S. Mining Laws of 1872 provide for mining on Federal lands. The planning process will consider access needs for mineral exploration in conjunction with surface resource values and make decisions about the surface resources. Decisions about mineral exploration are made only indirectly in the planning process.

H. North Cascades Smokejumper Base - The question of whether or not to close the base was resolved by the Regional Forester.

I. Local Decisions - The Forest Service is required to take management direction from local, regional and national levels. The forest plan is a Regional Forester decision.

J. Chemicals - This issue is addressed by a separate programmatic EIS. The Record of Decision allows the use of pesticides while requiring site-specific analysis of effects on adjacent land, streams, water systems and communities. The forest plan EIS is not the site-specific analysis called for.

APPENDIX B

DESCRIPTION OF THE ANALYSIS PROCESS

I. INTRODUCTION

Appendix B describes the analysis process used in developing the plan. It focuses on the quantitative methods used to perform the analysis and documents how the analysis was done.

A. Planning Problem

The Forest Service is responsible for determining how best to manage National Forest lands based on public desires and land capabilities.

The Okanogan National Forest has 1.7 million acres including sculptured peaks, tumbling waterfalls, crystal clear lakes and rivers, hundreds of species of wildlife and fish, and two designated wildernesses.

Two major river systems drain the forest; the Okanogan River and its tributaries are located on the eastern portion of the forest, and the Methow River and its tributaries drain the western portion. The tributaries to the Skagit River drain the portion of the Mt. Baker-Snoqualmie National Forest west of the Cascades, which is administered by the Okanogan National Forest. There are over 150 lakes on the forest. Streams from the forest also drain into off-forest lakes and reservoirs.

An average annual volume of 84.4 million board feet of timber is offered for sale from mixed conifer stands. Forty-one percent of the national lands are suitable and available for timber production. Approximately 43 percent of National Forest acres are grazable or potentially grazable lands. More than 56,000 animal unit months of grazing are used through permits. About 420 species of fish and wildlife live on the forest.

The sunny, dry climate, clean air and the rich diversity of recreation opportunities attract over 900,000 visitor days each year. People come from all over to fish and hunt; hike and mountain climb; camp and picnic; and cut firewood. Cross-country skiing, snowmobiling and helicopter skiing are popular winter sports.

The forest lies mostly in Okanogan County, but extends into Skagit, Whatcom and Chelan counties. It extends from the International Boundary with the Province of British Columbia south to the Methow-Chelan Divide, and from the North Cascade National Park Complex east to the Okanogan and Ferry county line.

The mainstays of the economy are recreation, timber and agriculture. The largest cities in the area are Omak and Okanogan. Tonasket, Twisp, Brewster, Pateros, Oroville and Winthrop are other important population centers. Forest headquarters is located in Okanogan. Ranger District offices are located in Tonasket, Twisp and Winthrop. The North Cascades Smokejumper Base, located south of Winthrop, is also part of the Okanogan National Forest organization.

The Okanogan National Forest is reached from the north and south by U.S. Highway 97, and from the east and west by Interstate 90, U.S. Highway 2 and State Highway 20.

Public interest includes divergent viewpoints about the use of market commodities such as timber, forage, minerals, and nonmarket commodities such as wilderness, unroaded recreation, scenery, wildlife, old growth and habitat diversity. The forest's major planning goal is to provide enough information to help decision-makers determine which combination of goods, services and land uses will maximize net public benefit. (This concept is further discussed in Section IV of this Appendix.) The National Forest Management Act (NFMA) and the regulations developed under NFMA (36 CFR 219) provide the analytical framework to address this objective; they also state that the requirements of the National Environmental Policy Act (NEPA) and its regulations (40 CFR 1500-1508) must be applied in this analysis process.

B. Planning Process

The planning and environmental analysis process brings a new outlook and a new technology to National Forest land management, principally: (1) processes formerly used to make individual resource decisions are now combined to help make integrated resource management decisions, and (2) new mathematical modeling techniques are used to assist in the proposed land use problem, including identifying the most cost-efficient pattern of land management. The 10-step planning process is discussed in the NFMA regulations and in Chapter I of this document. Appendix B describes the analysis phase of this process covering steps 3, 4, 5 and 6. The judgment phase, steps 1, 2, 7 and 8, is described in Chapters I, II, and in Appendix A of the DEIS. The execution phase, steps 9 and 10, is presented in the Proposed Forest Plan.

Public issues and management concerns are key to all steps. They are described in Chapter I and in Appendix A and should be referenced to understand the background for some of the analysis and in particular, the alternatives.

The 10-step planning process is summarized below:

1. Issues and Concerns (Planning Step 1)

A public issue is a subject of widespread public interest identified through public involvement. Management concerns and opportunities are identified by the Forest Service. After issues, concerns and opportunities are identified, the interdisciplinary team evaluates the responses and decides which ones will be considered. Each of these will be addressed by one or more alternatives.

2. Planning Criteria (Planning Step 2)

Planning criteria guide specific planning steps, namely inventory data (step 3), the analysis of the management situation (step 4), and the formulation and evaluation of alternatives (steps 5 and 7). Other criteria are designed to achieve the objective of maximizing net public benefits.

3. Inventory Data and Collect Information (Planning Step 3)

The Interdisciplinary Team determines what data are necessary based on the issues and concerns. The analysis of the management situation, formulation of alternatives, and monitoring require data on resource capabilities, existing supply and demand, expected outputs, benefits and costs. Existing data are used whenever possible, but are supplemented with new data to help resolve sensitive issues or management concerns. Data are on file in the Forest Supervisor's Office.

4. Analysis of the Management Situation (Planning Step 4)

This analysis examines resource supply and market conditions and determines suitability and feasibility for resolving issues. A land use designation model (FORPLAN) is used to address a number of specific requirements, including benchmarks. Requirements include: (a) the projection of the forest's current management program; (b) determining the forest's ability to produce a range of goods and services from minimum management to maximum production; (c) evaluating the feasibility of reaching the national production goals (RPA targets) and social demands identified as issues and concerns; and (d) identifying monetary benchmarks which estimate the output mix which maximizes present net value (or minimizes the cost) of resources having an established market or assigned value and meeting other departure analysis requirements. The Analysis of the Management Situation (AMS) document is on file in the Forest Supervisor's Office.

5. Formulation of Alternatives (Planning Step 5)

The information gathered during the first four planning steps is combined and analyzed to formulate alternative management plans. The alternatives reflect a range of resource management direction. Each major public issue and management concern is addressed in one or more alternative. Management prescriptions and practices are formulated to represent the most cost-efficient way of attaining the objectives for each alternative. Both priced and nonpriced outputs are considered in formulating the alternatives. See Forest Planning Record: Analysis of Management Situation.

6. Estimation of Effects of Alternatives (Planning Step 6)

The physical, biological, economic and social effects of each alternative are estimated and analyzed to determine how each responds to the range of goals and objectives assigned by the RPA program. FORPLAN is used to estimate some of the economic and physical output effects, while other methods are used for remaining effects. The analysis includes: (a) direct effects; (b) indirect effects; (c) conflict with other Federal, State, local and Indian tribe land use plans; (d) other environmental effects; (e) historic and cultural resources; and (f) means of mitigation.

7. Evaluation of Alternatives (Planning Step 7)

The planning team compares alternatives considering the present net value, social and economic effects, outputs of goods and services, and overall environmental protection.

8. Selection of the Preferred Alternative (Planning Step 8)

The evaluation is given to the Forest Supervisor who decides which alternative he or she prefers. Together, the planning team and Forest Supervisor present the alternatives to the Regional Forester -- who makes the final decision -- with the Supervisor's recommendation. The preferred alternative is then written up in detail for the draft forest plan.

9. Implementation (Planning Step 9)

To implement the forest plan, the Forest Service offers timber for sale, allows livestock grazing and takes other actions on lands designated for these purposes. The plan predicts outputs of wildlife, recreation, clean water and other resources.

10. Monitoring (Planning Step 10)

The plan includes a monitoring program to insure that the objectives of the plan are met. This program is described in the draft and final forest plans.

II. INVENTORY DATA FOR INFORMATION COLLECTION

A. Forest Data Base

Inventory data was collected for many resources so that issues and concerns could be addressed, limitations defined, and capability determined. Some of the data was necessary to develop the Forest Planning Model and to determine capability and analysis areas.

1. Capability Areas

A Soil Resource Inventory (Rother 1976) and Ecoclass Mapping were completed in 1976 for the Okanogan National Forest. The two were done as separate inventories, so while there was quite a bit of correlation, it was not precise. The Ecoclass Map, in combination with stand condition, slope class, exposure, soils and elevation zone, was used as the basis of the Capability Areas. Over 17,000 individual capability areas were identified and used to describe the bio-physical character of the forest.

2. Analysis Areas

One of the first steps in the development of FORPLAN (Forest Planning Model) was to divide the forest into analysis areas. For this task, the TRI (Total Resource Information) System 2000 database was used extensively. Analysis areas are tracts of land with relatively homogeneous characteristics in terms of the outputs and effects that are being analyzed within the FORPLAN model. They serve as the basic unit of land in the model for which a range of prescriptions are developed to achieve various multiple use objectives. Their delineations were intended to capture the significant social, biological, physical and economic differences in the way the land responds to alternative management strategies, and yet keep the model size to a minimum to enable quicker and less expensive analysis. The focus of delineating analysis areas was upon addressing certain issues, concerns and opportunities identified at the outset of the planning process.

The Interdisciplinary Team began developing the FORPLAN model during March 1980. Since then, and as the planning process has evolved, several different analysis area stratifications and model formulations have been explored. The land stratification that was used for this DEIS was settled upon on September 24, 1984. It divided the 1.7 million acres of the Okanogan National Forest into 377 analysis areas. Of these, 371 account for the 703.2 thousand acres of suitable and available forested land from which FORPLAN can schedule timber harvesting. In general, most analysis areas are larger than 100 acres. The largest is 626,220 acres. They are not generally contiguous.

The Interdisciplinary Team identified five special purpose analysis areas to define lands not suitable for timber management. Wilderness and the North Cascades Scenic Highway (NCSH) are two legally constraining analysis areas. Timber harvest in the NCSH is permissible as long as scenic qualities are maintained. Lands not suited for timber harvest are grouped into one analysis area. Riparian areas have also been grouped into one analysis area because they have common legal constraints, such as temperature control, common dispersion constraints and special yield tables. The fifth special analysis area is developed recreation.

The following discussion presents the rationale behind the identification and delineation of the analysis areas according to the six FORPLAN levels of analysis area identifiers.

a. Level One

Level One of the analysis area identifiers described whether the area was inventoried as deer winter range or not. Originally, lynx habitat was also identified separately. However, this resulted in several times the number of analysis areas that the FORPLAN matrix generator would accept. After reconsideration, the team decided to include lynx habitat in the "other" category.

LEVEL ONE IDENTIFIERS

1. Deer
3. Other

b. Level Two

Level Two of the analysis area stratification identified whether the area was inventoried as being roadless or not.

LEVEL TWO IDENTIFIERS

1. Roadless
2. Roaded

Those lands currently providing semi-primitive recreation opportunities are the areas delineated as "roadless." They also indicate areas that would have to incur up-front road construction costs before any timber management activities could be scheduled.

c. Level Three

Level Three was used to identify inventoried visual quality objectives.

LEVEL THREE IDENTIFIERS

1. High - Retention
2. Moderate - Partial Retention
3. Low - Modification and Maximum Modification

d. Working Group

The Okanogan National Forest timber inventory is stratified into working groups. Each stand on the forest is assigned to a working group based on its species composition, productivity class, and whether or not it is suitable and available for timber production.

WORKING GROUP IDENTIFIERS

1. Moist Productive (Mixed Conifer)
2. Dry Productive (Mixed Conifer)
3. Lodgepole Pine
4. Low Productive
5. Other (Not suitable or available)

The working group delineation was key to addressing many of the planning issues. Both the mountain pine beetle and the lynx habitat issues are tied to the harvesting of lodgepole pine. The working group stratification better enabled the team to evaluate the effects of alternative harvest schedules on the habitat needs of certain identified indicator species.

In addition, since each working group is composed of different species, each also had its own set of multiple use silvicultural prescriptions and growth and yield tables. Many of the costs and values used in FORPLAN were stratified according to the working groups. Stumpage values were based on a statistical analysis of timber sale appraisal summary data, and cut and sold reports. These values were specific to each working group by diameter class. The cost of regeneration, site preparation, timber stand improvement, sale preparation and logging were also tied to the working groups.

Some of the costs were by necessity averaged within or across the working groups when it would have been more desirable to have a finer level of economic detail. Regeneration costs are a good example. In some plant communities, success of natural regeneration has been documented, while in others planting is required to achieve silvicultural objectives. The approximate proportion of each working group in each plant association is known, but plant associations are not mapped, so analysis areas cannot be used for spatial location. Regeneration costs for each working group were based on a weighted average of planting versus natural regeneration.

e. Land Class

The Land Class analysis area identifiers were used to categorize the land into the following slope classes. Costs of timber management, fuels treatment and road construction varied by slope class.

LAND CLASS IDENTIFIERS

1. Gentle (0-35 percent)
2. Medium (35-59 percent)
3. Steep (60 percent and greater)

f. Existing Condition Class

The sixth and last level of FORPLAN identifiers used to define analysis areas was the existing condition class. This level was used to help describe the current status of both vegetated and nonvegetated lands. It was used primarily to identify which silvicultural options were appropriate to consider on suitable and available forested lands. It was also used to help monitor the effects of alternative harvest schedules on the vegetative successional stages as related to wildlife habitat requirements. Lands which were either not vegetated (i.e. water) or vegetated but with no outputs or effects being tracked in FORPLAN (i.e. brush) were aggregated into one "catch all" identifier.

CONDITION CLASS IDENTIFIERS

1. Regeneration Needed
2. Seedlings and Saplings
3. Poles
4. Two-Storied Stands
5. Mature Sawtimber
6. Old Growth Habitat

Because of model size, existing timber stands that have been precommercially thinned were aggregated with unthinned stands of similar condition class. Two-story stands with lightly stocked overstory and seedlings and saplings in the understory were aggregated with seedlings and saplings. Symbolic ages were assigned to each condition class to facilitate modeling. Symbolic ages represented the approximate physiological age of median stands in each condition class. Symbolic ages did not take into account past suppression, disease, and similar factors that affect plant vigor.

3. Production Coefficients

The ID Team developed coefficients for timber, range, wildlife, recreation, water and visuals. Attempts were made to use most of the resource coefficients in the planning model. Some costs were calculated outside the model but using information from some of the reports from the model. More detail can be found in Chapter III.F of this appendix.

4. Suitable Lands

a. Definition of Suitable Lands

The 1977 National Forest timber inventory classified approximately 40 percent of the National Forest as productive forest lands that were available and capable of timber production [II.4.(d) below]. Productive forest lands were defined as capable of producing a culmination of mean annual increment (CMAI) of at least 20 cubic feet per acre per year. New planning regulations published in the Federal Register in 1982 required the forest to review all lands and re-classified them as either `Suitable' or `Non-Suitable' for timber production based upon four criteria. These criteria for suitable lands are:

(1) The land is forested. Forested lands are occupied by at least 10 percent tree cover of any type or species (36 CFR 219.3).

(2) Technology is available to ensure timber production from the land without irreversible resource damage to soils productivity or watershed conditions.

(3) Adequate assurance is available that the lands can be reforested following regenerating harvests.

(4) The land has not been withdrawn from timber production by an Act of Congress, the Secretary of Agriculture, or by the Chief of the Forest Service (36 CFR 219.14)

The Okanogan National Forest has lands that are unsuitable because of inability to meet one or more of all of the above criteria.

Criteria for minimum growth potential are no longer used to determine lands to be considered for timber production.

The Washington State Wilderness Act of 1984 placed approximately 36,000 acres of Okanogan National Forest land capable of timber production in the Lake Chelan/Sawtooth and Pasayten Wildernesses. According to 1982 regulations and following passage of the Washington Wilderness Act, approximately 41 percent of Okanogan National Forest lands are tentatively suitable for timber production [II.4.(d) below]. Of these lands, 86 percent (604.5 thousand acres) are capable of producing a CMAI of at least 20 cubic feet per acre per year of wood. According to the 1977 inventory approximately 716.1 thousand acres were capable of producing a CMAI of 20 cubic feet per acre. This represents a reduction of 16 percent. Reductions in suitable acres capable of producing at least 20 cubic feet per acre per year since 1977 result from areas where technology is not available to reforest following harvest, and lands where technology is not available to avoid irreversible resource damage as a result of timber management and suitable acres placed in wilderness by Act of Congress. The remaining suitable lands (98.8 thousand acres) are incapable of producing a CMAI of 20 cubic feet per acre per year.

b. The Regeneration Difficulty Screen

Skills

Persons from the Supervisor's Office who were on the Interdisciplinary Team included a Soil Scientist, Forest Silviculturist and Wildlife Biologist. At the District level expertise was provided by the District Ranger and Foresters, Silviculturists and Reforestation people. The Area Ecologist was consulted throughout the process.

Step 1 - Coordination between Area Forests

In December 1983 silviculturists, soil scientists, hydrologists, the Area Ecologist and other personnel from the Colville, Okanogan and Wenatchee National Forests met in Spokane to develop tentative guidelines for identifying lands not suitable for timber production due to regeneration difficulty or because of irreversible or irretrievable resource damage. The Wenatchee and Okanogan National Forests met again in January 1984 and coordinated further.

Step 2 - Criteria and Field Review

Criteria for reforestation difficulty were based upon work by Clint Williams, Area 2 Ecologist. Specific cells where reforestation might not be assured according to NFMA requirements were identified by combinations of ecoclass, slope, aspect and elevation. Subsequent field verification by the Forest Silviculturist, Timber Staff and Area Ecologist determined that the criteria were not specific enough and that both suitable and unsuitable lands were caught in the screen. Additional work identified a strong observed correlation between soil rock content and anticipated reforestation difficulty. Criteria were redefined based upon soil rock content, ecoclass and elevation. Extensive field reviews conducted by the Forest Silviculturist and the Forest Soil Scientist during July and August of 1985 indicated that the revised criteria are acceptable for Forest Planning.

Step 3 - Non-mappable Unsuitable Inclusions

Localized areas with seasonal high water tables occur on all Ranger Districts. During the 1981 - 1983 field seasons, several high elevation timber stands were discovered which contain large acreages of perennially saturated soils. Technology does not exist to assure reforestation following harvest on these sites. Several high elevation stand exams were analyzed, and for specific areas with a high percentage of this phenomena, a reduction in suitable acres was calculated.

c. The Irreversible and Irretrievable Resource Damage Screen

Skills

Persons from the Supervisor's Office who were on the Interdisciplinary Team included a Soil Scientist, Forest Silviculturist and Wildlife Biologist.

Step 1 - Coordination between Area Forests

In December 1983, soil scientists and hydrologists from the Colville, Okanogan and Wenatchee National Forests met to develop tentative guidelines for identifying lands not suitable for timber production due to irreversible or irretrievable soil resource damage. The Wenatchee, Colville and Okanogan National Forests met in January 1984 at Spokane to review the tentative proposals for criteria for irreversible soil resource damage lands. Agreement was reached on the criteria for lands which fit the definition for unsuitable.

Step 2 - Application to the Okanogan National Forest

The critera was taken to the management group on the Okanogan National Forest for their review and approval. These criteria applied to lands where technology was not considered to be available to ensure timber production without irreversible resource damage. These criteria are applied to all forested lands which currently have (or have had) ten percent or greater crown cover of commercial timber species. Lands withdrawn for non-timber or other administrative purposes are not considered. The following criteria is used with the Okanogan National Forest "Soil Resource Inventory."

Step 3 - Criteria for Unsuitable Lands

The general criteria are listed below.

Snow Avalanche Paths

Mass Failure Areas (Rotational Slump/Earth Flows)

Debris Flows

Debris Slides

Extremely Steep Stream Valley Sidewalls/
Accelerated Mantle Creep

Specific criteria can be found in the 1920 Land Management Planning memo, Subregional Coordination for Timber Land Suitability Criteria, January 17, 1984. The Forest Supervisor approved the criteria on April 5, 1984.

d. TABLE B-1 Land Suitability Table

Pacific Northwest Region Standard Format for Displaying Land Suitability

	Not Suited For Timber Production		Totals
I. Total National Forest Area			1,745,100
A. Other Ownerships	38,900		
II. Net National Forest Area			1,706,200
A. Water	6,800		
B. Non-Forest (not stocked with 10% tree cover)	197,470		
C. Lands Developed for Other Than Timber Production Purposes (crops, improved pasture, residential, admin. areas, improved roads, powerline clearings)	14,600		
III. Forested Lands			1,487,330
A. Withdrawn from Scheduled Timber Production [219.14(a)(4)]			
1. Wilderness	529,210		
2. Research Natural Areas	150		
3. Other (Wild & Scenic Areas, Experimental Forests -- listed by reason)			
Subtotal	529,360		
B. Lands Growing Less Than $20ft^3$/ac/yr			
1. Lands classified as unsuitable	198,180		
2. Lands classified as suitable	(98,750)		
3. Lands classified as separate suitability component	98,750		
C. Irreversible Resource Damage [219.14(a)(2)]	12,750		
D. Regeneration Difficulty [219.14(a)(3)]	43,836		
E. Regeneration Difficulty Lands Classified as Separate Suitability Component			
IV. Tentatively Suitable Forest Land		(a) 98,750 (B2,B3+E)	(b) 604,450
V. Total Suitable & Non-Suitable Lands	1,003,000		703,200 (a) + (b)
VI. Suitable & Non-Suitable Land Summary Approved for Forest Planning prior to Chief's Letter of July 15, 1983 **	1,021,000		685,200
VII. Land Status Under Current TM Plan	990,100		716,100

** Land status is pre-Washington Wilderness Bill. Land status following the Bill is:

Land Not Suitable for Timber Management: 1,025,100 acres
Land Suitable for Timber Management: 681,100 acres

A map of unsuitable forest lands can be found in the accompanying map package.

5. Allocations and Scheduling Alternatives

All the analysis area identifiers and prescriptions were used to allocate and schedule management activities over time for the various benchmarks and alternatives.

6. Monitoring

At intervals established in the Forest Plan, management practices will be evaluated to determine how well objectives have been met, how accurate efforts and cost projections are, and how closely management standards and guidelines have been applied. The results of monitoring and evaluation may be used to analyze the management situation during review and revision of the Forest Plan in future years.

The Forest Planning data base will provide a means by which changes in resource production rates, differences in inventory data, etc., can be measured and will also be used to monitor implementation activities.

7. Plan Implementation Programs

The data base provides biological and physical data that will help develop subsequent programs for Plan implementation. As more information becomes available, the data base will be updated and improved. Refer to Proposed Forest Plan for more details on implementation.

B. Sources of Data

The soils on the entire forest are mapped and classified. Documentation is in the Okanogan National Forest's Soil Resource Inventory (Rother 1976) with accompanying maps.

The streams and rivers were inventoried using the U.S. Forest Service's Region 6 Stream Classes -- I-IV. These describe the current uses of a stream or river and classifies it by its relative importance.

In 1978 all of the tree stands which met the definition of forested land were mapped and described. This resulted in over 17,000 stands being delineated. The mapping and descriptions were updated in 1983. This provided much of the information used to identify analysis areas.

Each of the timber stands were classified into a plant successional stage which when used with the Ecoclass map became an inventory of plant diversity.

Timber data regarding existing volumes and growth were based on a 1977 timber inventory.

The forest's recreation potential was identified through the Recreation Opportunity Spectrum inventory completed in 1981 and updated in 1984.

The visual resources of the Okanogan were inventoried prior to starting the planning process. It was updated in 1978 and 1979.

A fuel types inventory and map and fire occurrence map (for 1970-1979) were available.

Information from range analysis was used to map vegetative types for suitability for livestock grazing and to determine carrying capacity.

Wetlands and floodplains were mapped using false color infrared photos. Some of the larger floodplains were previously determined by the Soil Conservation Service and the Corps of Engineers. These were documented in floodplain reports.

Land status information was used and continually updated as conditions changed. It included private land, County, Ranger Districts, BLM and wilderness.

Transportation Planning Areas were available and used to evaluate the implications of alternatives to transportation efficiency and cost.

Economic benefits and trends were derived from Region 6 Planning Direction, 1920 memo of November 10, 1983. Economic costs are forest statistics developed from Wenatchee and Okanogan forest experience.

Water resource data was gathered from a variety of sources. It was summarized and documented in "Water Resource Inventory and Basis for Estimating Soils and Water Impacts" by Mel Bennett and Larry Tripp, 1981, Okanogan National Forest.

Information was available on Wild and Scenic Rivers based on an inventory published by the Park Service in 1982, and the Washington Statewide Comprehensive Outdoor Recreation Plan.

Publications, Forest Documents and Studies:

Deer winter range cover mapping by D. Lowry, 1984.

Lynx/Lodgepole Management Guidelines by D. Brittell and D. Lowry, 1984.

Snag Density Study by N. Warren, 1984.

Streamside Management Unit Classification and Mapping by M. Bennett, 1984.

Timber/Deer Coordination Report defining cover needs by D. Lowry et. al, 1983.

Wildlife map of Tonasket District east of Okanogan River by R. Haines, 1981.

Old Growth Surveys and Analysis by D. Lowry, 1981-84.

Wildlife Habitat Relationships of Eastern Washington (Area 2) by M. Wischnofske, 1977.

Wildlife of the Okanogan National Forest, Habitat Requirements and Management Guidelines by C. West, 1976.

Ecoclass and Timber Stand Data in TRI (Total Resources Information) System, 1970-85.

Report on the Winter Range Survey and Deer Census (formerly part of Chelan National Forest) by H. Gustafson, 1938.

Reports on the Winter Range Survey and Deer Census (formerly part of Chelan National Forest) by O. Edwards, 1936-37.

Early Winters Alpine Sports Study Final EIS, 1984.

Okanogan National Forest Draft EIS and Plan, 1982.

Miscellaneous wildlife working papers and maps, on file Okanogan National Forest.

Miscellaneous timber management working papers and maps, on file Okanogan National Forest.

1977 Timber Inventory Data, on file Okanogan National Forest.

Ecoclass mapping was done in the mid 1970's. Mapping criteria and maps on file, Okanogan National Forest.

Insect and Disease Conditions on the Okanogan National Forest, Forest Pest Management Working Paper, 1980.

Okanogan National Forest Primary Base Series Maps, Transportation Inventory System, and Arterial and Collector Road Management Plan by R. Crowell, et. al, 1982-1985.

Transportation System Development, Maintenance and Operation Analysis for the Okanogan National Forest by R. Crowell, 1984-1985.

Soil Resource Inventory for the Okanogan National Forest by E. Rother, Pacific Northwest Region, 1976.

Plant Associations of the Okanogan National Forest, by C. Williams and T. Lillybridge, Pacific Northwest Region, 1982.

The Okanogan Mule Deer, by D. L. Zeigler, Washington Department of Game in cooperation with Okanogan National Forest, 1978.

Biological Unit Management Plan for the Methow Deer Herds, by D. L. Zeigler, Washington Department of Game in cooperation with Okanogan National Forest, 1975.

Other Agency Input, 1980-85:

Washington Department of Game

Washington Department of Fisheries

U.S. Fish and Wildlife Service

Colville Confederated Tribes

Okanogan County Planning Department

III. THE FOREST PLANNING MODEL

A. Overview

Forest Planning is a very complex process in which an enormous amount of information and interdependent decisions must be considered before an alternative management plan can be recommended as the one which best addresses the issues, concerns and opportunities that were identified at the outset of the planning problem. Because of this, several interrelated computer models and analytical tools have been developed and utilized to help determine the decision space within which alternatives can be developed and to evaluate their associated outputs and effects.

One of these models is called FORPLAN. The name is an acronym for Forest Planning Model. FORPLAN is a linear program that assigns unique sets of management activities to specific areas of the forest to compare the productivity of measurable goods and services towards a specific goal called an "objective function." The management activities are combined into compatible sets representative of the multiple uses that could apply to the analysis areas. These sets of management activities are called "management prescriptions."

FORPLAN assigns only those management prescriptions to the analysis areas which produce the goods and services that achieve the objective function in an optimal way given the objective function and constraints used. It also schedules the production of the goods and services over time.

Several releases of two different versions of the model have been developed. The Okanogan National Forest modeling analysis was performed with Version I, Release 14. The system is maintained and operated on the UNIVAC computer at Fort Collins, Colorado.

The FORPLAN model that was set up for the Okanogan National Forest was specifically designed to help the Interdisciplinary Planning Team analyze the economic and production tradeoffs associated with the recreation, timber, range, watershed and wildlife resources, and to help evaluate the extent to which various alternative management scenarios were able to address and resolve the identified planning issues.

One key step in the development of the FORPLAN model was to divide the total forest into "analysis areas." Analysis areas are tracts of land with relatively homogeneous characteristics in terms of the outputs and effects that are being analyzed in the FORPLAN Model. Their delineations were intended to capture the significant social, biological, physical and economic differences in the way the land responds to alternative management strategies. The focus of the delineations was upon the planning issues.

In the FORPLAN model, analysis areas were allocated to prescriptions, which are composed of management emphases and intensities, in order to achieve the resource management objectives of a particular benchmark analysis or alternative. "Management emphasis" is a FORPLAN term and is directly related to the "management areas" described in the DEIS. Each management area contains a set of standards and guidelines concerning how the resources in that allocation are to be managed in order to meet the multiple use objectives of that management area. From one to eight different management emphases were available to each analysis area depending upon its resource production opportunities.

Management prescriptions are combinations of scheduled activities and practices, and their associated outputs and effects. The outputs and effects associated with the prescription choices are represented as mathematical coefficients in the respective decision variables. FORPLAN had from one to six prescriptions to choose from for each management emphasis for each analysis area. In general, each analysis area contained from one to twenty-one prescription choices.

Alternatives are generated by applying constraints to produce a specified range of goods and services or to allow only a specified range of goods and services or to allow only a specified set of management prescriptions to be assigned to specific analysis areas. These constraints are designed to achieve or maintain a situation considered necessary to meet the overall goal of the alternative. The conditions set by the constraints are satisfied before the objective function is optimized. All alternatives had the same objective function -- maximize present net value. In other words, after meeting all constraints, the FORPLAN model allocated remaining economic choices to maximize present net value. By using present net value, the model attempted to identify the most cost efficient solutions for the set of objectives.

B. The Analysis Process and Analytical Tools

As directed in the Planning Regulations [36 CFR 219.12(f)(8)]:

> "Each alternative shall represent to the extent practicable the most cost efficient combination of management prescriptions examined that can meet the objectives established in the alternative."

The Interdisciplinary Team analyzed economic efficiency at several stages of the planning process in order to be reasonably assured that the alternatives developed and displayed in the DEIS complied with the intent of this direction. The discussion of the analytical process and tools used will follow this general outline:

1) Analysis prior to FORPLAN
2) How FORPLAN was used in the analysis
3) Any analysis done in addition to FORPLAN model analysis

Once the issues, concerns and opportunities were identified, and the planning criteria were developed, the Interdisciplinary Team began to formulate management areas and their associated standards and guidelines. This step was probably one of the most difficult and laborious, and possibly the most important task of the interdisciplinary planning process. Management areas coupled with their respective standards and guidelines provide specific direction for implementation, and serve as a framework for how to use, develop and protect the forest's resources in a manner consistent with the goals and objectives of the various alternatives.

Since the standards and guidelines provide general, rather than site or project specific direction on how to implement the Forest Plan, little opportunity was available to calculate a present net value or benefit/cost ratio for many of them. However, economic efficiency was a strong consideration throughout their development. For example, from a silvicultural standpoint, clearcutting and planting is sometimes more desirable in terms of control over species mix than is natural regeneration. However, natural regeneration is often more cost effective. The standards and guidelines state that natural regeneration will be taken advantage of unless artificial regeneration is necessary.

Another example concerns the determination of which trees are to be left after a regeneration harvest in order to meet the cavity nester habitat needs for snags. The resulting snag management plan specifies the number and size of trees that are to be left as future snags in such a way as to have minimum impact on the timber volumes foregone from harvest.

Concurrently with the formulation of management areas and the standards and guidelines, the Interdisciplinary Team also began to identify the analysis areas that would be used in the FORPLAN model (see Chapters II.A and III.C of this Appendix). For this task, the Total Resource Information (TRI) System 2000 (S2K) forest data base was used extensively to analyze different analysis area combinations that could be used to model and evaluate the production and economic tradeoffs between the recreation, timber, range, visual and wildlife resources on the forest. The objective of this exercise was to delineate the analysis areas in such a way as to capture the important variations in the biological, social and economic characteristics of the land and yet keep the FORPLAN model size to a minimum so it was quick, less expensive to run and manageable.

Once the final analysis area delineation was settled upon, the next step was to develop the prescriptions for the

FORPLAN model. This included the development of timber yield tables (see Chapter III.E), other resource yield coefficients, and the economic costs and benefits (see Chapter IV) associated with each FORPLAN prescription. These prescriptions were designed to enable FORPLAN to analyze the timber related outputs and effects associated with alternative land allocations and multiple use objectives.

To provide FORPLAN with the harvest scheduling flexibility needed to satisfy the multiple use objectives of each alternative, a wide range of timber yield tables was developed for each management area and working group combination. The development of empirical yield tables was based on statistical T-tests and regression analyses of 1977 CFI plot data. (See Forest Planning Document: Empirical Yield Tables) The managed timber yield tables were developed with the computer programs "PROGNOSIS" and "LPSIM" (refer to Forest Planning Document: Managed Yield Tables). Low Productive working group inventory and yields were based upon data collected on intensive ecology plots during development of the Okanogan Plant Association classification. During the 1977 Forest Inventory, lands not capable of producing 20 cubic feet per acre per year at culmination of the mean annual increment (CMAI) were considered "unproductive" and excluded. Under the existing Timber Management Plan approved in 1969 these low productivity lands are not managed. Very little data are available on growth or inventory on these lands. Forest experience played an important role in determining the reasonability of the results from the growth and yield predictive models. As the yield tables were developed, they were reviewed by the respective resource specialists to determine if they achieved their intended objectives (i.e. thermal cover, retention foreground, etc.).

A soil expectation value was calculated for each managed yield table. In some cases prescriptions were dropped if another prescription achieved the intended objectives equally as well but had a higher present net value. In some cases special timber yield tables were developed to provide for specific resource needs (for example: wildlife habitat, visual quality objectives, range forage). A total of 25 managed timber yield tables were developed for use in FORPLAN.

Timber stumpage values and logging costs were based on a statistical analysis of timber sales (2400-17 Forms). (See Forest Planning Document: Economic Tables.)

Stumpage values were derived from Regional Office 1920 letter, Economic Values for Forest Planning, February 24, 1984. Logging costs were developed by a comparative appraisal approach using historical data. Costs for reforestation, site preparation, timber stand improvement, sale preparation and other timber management related activities were developed by the Timber Staff and Forest Silviculturist based on experienced costs.

The development of recreation output coefficients was based on an analysis of the Forest Recreation Inventory Management (RIM) data base. Operation and maintenance costs were based upon recent expenditures and use figures and forest experience about how recreation consumption patterns would react to various management emphases.

FORPLAN was used to analyze the production of outputs and physical trade-offs between the recreation, timber, visual, range and wildlife resources on the forest for both benchmarks and alternatives. The model was utilized to analyze the most economically efficient timber related outputs and effects associated with the achievement of the multiple use objectives of an alternative. Which prescriptions FORPLAN identified depended upon the objective function and the set of constraints used to represent a particular benchmark or land management plan alternative. The objective function usually used was one that maximized present net value, subject to first satisfying all the specified constraints. The following is a list of some of the types of constraints used:

1) constraints on harvest flow, rotation length and ending inventory;

2) dispersion and wildlife minimum management requirement constraints;

3) constraints on the amount of analysis areas available to certain management area prescription sets;

4) rate of harvest constraints in scenic viewsheds, intensive recreation allocations and riparian areas;

5) constraints for snow intercept thermal cover in high density deer winter range;

6) constraints on amount of old growth harvested and retained; and

7) constraints on amount of roadless area which would be available for timber management.

Once the model had determined that a feasible solution existed by satisfying all of the constraints, it would then search for the set of prescriptions and timing choices which permitted it to optimize the solution according to the specified objective function.

Which land allocation and resource management investment options resulted in the most economically efficient solution was determined through the FORPLAN model. Benchmarks were run to show the decision space available or to define opportunity costs. They were analyzed with FORPLAN through combinations of different objective functions (maximize timber or maximze present net value) and constraints on harvest flow, rotation length, minimum management requirements (MMRs) and discretionary constraints needed to achieve the respective multiple resource objectives. (Refer to Chapter VI, Analysis Prior to Development of Alternatives.)

Once the benchmark analyses were completed, the Interdisciplinary Team proceeded to evaluate the range of alternatives that were developed to address the issues, concerns and opportunities. (Refer to Chapter VII, Formulation of Alternatives.) Each issue, concern and opportunity was addressed in the alternatives either through land allocations, harvest scheduling, standards and guidelines, or policy statements. Alternatives were modeled through the specification of an objective function and a set of constraints that were necessary to achieve the intent of a particular alternative.

Sometimes the results from the analyses indicated the need to do more FORPLAN runs in order to improve upon the overall evaluation of the outputs and effects of a particular alternative. Sometimes the need was apparent to develop another alternative and proceed through the analysis process with it. Once the team was satisfied that the outputs and effects of the alternatives had been fully addressed, their implications with regards to income and jobs in the local economy were analyzed. After all of this was done, the Interdisciplinary Team along with the Forest Management Team and District personnel then evaluated how well each alternative addressed the issues, concerns and opportunities that were identified at the outset of the planning process.

C. Identification of Analysis Areas

One of the first steps in the development of FORPLAN (Forest Planning Model) was to divide the forest into analysis areas. For this task, the Total Resource Information System 2000 data base was used extensively. Analysis areas are tracts of land with relatively homogeneous characteristics in terms of the outputs and effects that are being analyzed within the FORPLAN model. They serve as the basic unit of land in the model for which a range of prescriptions are developed to achieve various multiple use objectives. Their delineations were intended to capture the significant social, biological, physical and economic differences in the way the land responds to alternative management strategies, and yet keep the model size to a minimum so that it was quicker and less expensive to perform analysis with. Of course, the focus of delineating analysis areas was upon addressing certain issues, concerns and opportunities identified at the outset of the planning process.

Discussion of the rationale behind the identification and delineation of the analysis areas according to the six FORPLAN levels of analysis area identifiers can be found in Chapter II.A.2.

D. Identification of Prescriptions

1. Overview

The National Forest Management Act (NFMA) regulations define management prescriptions as "management practices selected and scheduled for application on a specific area to attain multiple use and other goals and objectives" (36 CFR 219.3). Management prescriptions consist of a goal statement which establishes the purpose of the prescription and a compatible set of management practices designed to develop and/or protect some combination of resources, and create or perpetuate a desired condition. Prescriptions were constructed within the requirements specified in 36 CFR 219.27. These requirements guide the development, analysis, approval, implementation, monitoring and evaluation of Forest Plans with regard to:

(a) Resource protection
(b) Vegetative manipulation
(c) Silvicultural practices
(d) Even-aged management
(e) Riparian areas
(f) Soil and water
(g) Diversity
(h) Access restrictions
(i) Recreation opportunities
(j) Visual quality
(k) Wildlife habitat

The process of identifying and subsequently developing management prescriptions began with an Interdisciplinary Team review of the issues, concerns and opportunities (ICO's). Prescriptions were then identified which would help address those ICO's which were related to decisions regarding standards and guidelines, scheduling or land allocations. There were other ICO's which were to be addressed through policy statements for which it was not appropriate to develop prescriptions.

Standards and guidelines represent the necessary mitigation and resource coordination measures that are required by existing laws, regulations and policies. Essentially, they provide the guidelines for how prescriptions are to be implemented on the ground. Scheduling and land use related ICO's were addressed with the FORPLAN model. For this purpose, coefficients of outputs and effects were constructed for the appropriate management prescriptions. These were then expressed in terms of FORPLAN prescriptions. The model was used to evaluate the implications of alternative scheduling and land allocation choices with regard to addressing the relevant ICO's.

Once the need and purpose for certain types of prescriptions were identified, goal statements for each management prescription were designed to respond to the questions raised by the ICO's. The Interdisciplinary Team then used professional judgment and evaluated existing policy, legislative direction and research for guidance in developing multiple resource management prescriptions. The resulting set of prescriptions represents a broad range of resource emphases, practices and capital investment levels. General policies, standards and guidelines were also written by the Interdisciplinary Team to cover practices common to all prescriptions and resource management situations that are forest-wide in scope.

The following references were used for analysis and development of the prescriptions:

Barrett, James W. Ponderosa Pine Saplings Respond to Control of Spacing and Understory Vegetation, Pacific Northwest Forest and Range Experiment Station, Research Paper PNW-106, 1970.

Barrett, J. W. Height Growth and Site Index Curves for Managed, Even-Aged Stands of Ponderosa Pine in the Pacific Northwest. USDA, Forest Service, Research Paper, PNW-232, 1978.

Barrett, J. W. The Silviculture of Ponderosa Pine in the Pacific Northwest: The State of Our Knowledge. USDA, Forest Service, PNW-97, 1979.

Barrett, J. W. Twenty-Year Growth of Ponderosa Pine Saplings Thinned. PNW-301, 1982.

Dolph, Robert E. How to Hazard Rate Lodgepole Pine or Second-Growth Ponderosa Pine Stands and Develop Management Guidelines to Prevent Future Mountain Pine Beetle Losses (with Revised Program for Measuring Tree Vigor.) USDA, Forest Service, PNW Region, 1983.

Interagency Committee for Outdoor Recreation. Washington Statewide Outdoor Recreation Plan, 1979.

Lowry, D. G.; R. Haines; and R. Shull. Timber/Deer Coordination - Report on Task I. Okanogan National Forest working paper, 1983.

Meyer, Walter H. Yield of Even-Aged Stands of Ponderosa Pine. USDA, Technical Bulletin 630, 1938.

National Forest Landscape Management, Vol. 2, Visual Management Systems, Chapter 1, Agricultural Handbook, Number 462, 1977.

Reineke, L. H. Perfecting a Stand Density Index for Even-aged Forests. J. Agric. Res. 46:627-638.

Rother, Earle. Soil Resource Inventory, Okanogan National Forest, Pacific Northwest Region, 1975.

Sassaman, Robert W.; J. W. Barrett; and A. D. Twombly. Financial Precommercial Thinning Guides for Northwest Ponderosa Pine Stands, USDA, Forest Service PNW Region, PNW-226, 1977.

Teply, John and John Berger. Mean Annual Increment Equations. Unpublished Working Paper, Pacific Northwest Region, USFS, 1971.

Thomas, J. W., et al. Wildlife Habitats in Managed Forests - the Blue Mountains of Oregon and Washington. USDA Forest Service Agr. Hndbk. No. 553. 1979.

USDA, Forest Service. ROS Users Guide, 1982.

USDA, Forest Service. USDI, Environmental Protection Agency. WRENS, An Approach to Water Resources Evaluation of Non-Point Silvicultural Sources (A Procedural Handbook). EPA-600/8-80-012, Athens, Georgia, 1980.

USDA, Forest Service. Silvicultural Systems of the Major Forest Types of the United States, Agriculture Handbook 445, 1983.

Williams, Clinton K. and Terry R. Lillybridge. Forested Plant Associations of the Okanogan National Forest, Pacific Northwest Region, USFS, 1983.

Zeigler, D. L. Biological Unit Management Plan for the Methow Deer Herds. WA Dept. Game in cooperation with Okanogan National Forest, 1975.

Zeigler, D. L. The Okanogan Mule Deer. WA Dept. Game in cooperation with Okanogan National Forest. Biol. Bulletin No. 15, 1978.

In addition to addressing ICO's, the process of designing management prescriptions was also guided by the following criteria:

a. Prescriptions are achievable and contain realistic practices.

b. They are general enough to accommodate the variable site specific conditions on the ground.

c. They are specific enough for the Interdisciplinary Team to develop accurate resource and economic output and effects coefficients.

d. To the extent practicable, they are the most cost effective means of achieving the intent of the prescription.

In order to explore a wide range of alternative ways to manage the forest for its multiple uses, the Interdisciplinary Team identified the capability of each analysis area to produce certain goods and services that were being analyzed within the FORPLAN model. All prescriptions which were related to the production of goods and services capable of being produced from an analysis area were then assigned to it. The assignment criteria focused on the geographical, physical, biological, social and economic characteristics of the analysis area as each is related to its ability to provide different types of recreation, visual, wildlife, forage and wood outputs. The prescriptions and schedule of activities which are selected depend upon the multiple use objectives of the alternative being analyzed. These objectives are expressed as mathematical "constraints" and/or objectives in the model.

2. Purpose, Criteria and Assumptions for Prescriptions

The framework for use, development and protection of the forest's resources is provided by the multiple-use standards and guidelines, and the prescriptions for each management area. The standards and guidelines provide direction on how to implement practices common to all prescriptions and resource management situations that are forest-wide in scope.

Prescriptions were developed for each of the twenty management areas to which different parts of the forest could be allocated. For each management area, a resource management goal and the general objectives to achieve a desired future condition are described. Management practices are implemented within each prescription according to the resource management goals of the prescription and the standards and guidelines. A map of the land allocation to each management area is available for each alternative. This map in conjunction with the associated prescriptions, and the standards and guidelines identify what activities will take place, where, and when during the implementation of any one alternative. The management prescriptions are identified at the end of this subsection and compared in Table B-2.

In order to represent the management results in terms of resource outputs, environmental effects, dollar values and dollar costs in the FORPLAN model, FORPLAN prescriptions were developed. Four of the management area presciptions are modeled by a number of FORPLAN prescriptions: Timber, scenic viewshed and some of the wildlife prescriptions. Five intensities of timber management are represented in FORPLAN, each with slightly different goals though all emphasize timber and each has a different set of practices. Two intensities of scenic viewshed management are represented in FORPLAN: Retention and partial retention. The timber/wildlife management areas and the wildlife/timber (lynx) are represented by six different intensities in FORPLAN.

Similarly, some of the mapping units (management area prescriptions) are represented in FORPLAN by one FORPLAN prescription: The two kinds of semi-primitive recreation prescriptions are represented by one FORPLAN prescription; two of the North Cascades Scenic Highway prescriptions are represented by one FORPLAN prescription; the three wilderness prescriptions are represented by one FORPLAN prescription. And finally, old growth habitat preservation is represented by minimum level management.

The FORPLAN prescriptions are expressed as "emphases" of which there are 9 and "intensities":

1. Minimum Level Management

2. Timber
   a. maximum present net value
   b. minimum cost
   c. maximum merchantable CMAI
   d. target tree diameter
   e. low productivity

3 Wildlife
   a. deer winter range habitat
   b. snag habitat
   c. lynx habitat
   d. riparian habitat

4. Roaded recreation/visual quality
   a. retention visual quality
   b. partial retention visual quality

5. Semi-primitive recreation

6. Developed recreation
   a. timber
   b. range
   c. roaded recreation
   d. unroaded recreation
   e. wildlife

7. Scenic area

8. Wilderness

9. Range
   a. with timber management
   b. without timber management

Cost efficiency was an overriding consideration for the development of all prescriptions. For example, if a prescription involved timber harvesting, the goal statement for the timber management standard and guideline called for the optimum production of wood consistent with various resource objectives, environmental constraints and economic efficiency. Therefore, prescriptions were developed with enough implementation flexibility to permit one practice to be selected over another if it proved to be more cost effective in achieving the objectives of the prescription.

Pursuant to the intent of 36 CFR 219.14 (b) and (c), economic efficiency was also considered in the development of the FORPLAN prescriptions for each management area which permitted scheduled timber harvesting. In many cases, a wide range of alternative silvicultural regimes was developed and made available to FORPLAN for a particular management area. These represented different schedules of management practices, outputs and effects, and economic consequences. The model could then select which prescriptions most efficiently achieved the objectives of the alternative. More detail on the development of the timber harvesting prescriptions for each management area is presented in Chapter III.E of this appendix.

Additional background information that went into prescription development is available in the following Okanogan Forest process documents entitled:

a. Diversity and Old Growth
b. Empirical Yield Tables
c. Managed Yield Tables
d. Range Resource
e. Recreation Resource
f. Spotted Owl Inventory

g. Visual Resource
h. Water Resource
i. Wildlife Resource

The goals of the twenty management area prescriptions are listed below. For a description of the criteria and assumptions, see Chapter II of the DEIS. A more detailed presentation of the prescriptions and the forest-wide standards and guidelines can be found in the Forest Plan.

1. Timber/Range

Goal: Emphasize commodity resources. Timber management, including harvest, planting and thinning, would be on-going and dominate the landscape. Transitory use of forage for domestic use would be encouraged.

2. Range/Timber

Goal: Intensively manage range land. Timber harvest would be scheduled if required to conform to range objectives.

3. Range - No Timber Management

Goal: Intensively manage range land.

4. Semi-Primitive

Goal: Provide summer and fall non-motorized recreational opportunities in a semi-primitive setting.

4m. Semi-Primitive Motorized

Goal: Provide year-round motorized recreational opportunities in a semi-primitive setting.

5. Scenic Viewshed

Goal: Provide the visual quality objective of Retention or Partial Retention in a roaded recreation setting.

6. North Cascades Scenic Highway - Primitive

Goal: To maintain the natural scenic quality and integrity of the North Cascades Scenic Highway in accordance with the Washington State Wilderness Act of 1984.

7. North Cascades Scenic Highway - Recreation

Goal: To maintain a high quality visual setting within the North Cascade Scenic Highway while providing recreational opportunities.

8. Research Natural Area

Goal: Preserve or provide examples of typical and distinctive ecosystems and habitats for scientific and educational use.

9. Deer Winter Range

Goal: Manage deer range and fawning habitats to provide conditions which can sustain optimal numbers of deer indefinitely, without degrading habitat characteristics such as forage, cover and soil.

10. Mountain Goats

Goal: Optimize habitat condition and perpetuate a healthy mountain goat population.

11. Bighorn Sheep

Goal: Manage bighorn sheep habitat to optimize habitat conditions and perpetuate a healthy population.

12. Timber/Wildlife (Lynx)

Goal: Provide the joint goals of timber utilization and lynx habitat. Manage the lodgepole pine type to provide and perpetuate a diverse mosaic of stand ages, conditions and associated vegetative types (Engelmann spruce/subalpine fir) for the general benefit of all wildlife present and the specific needs of lynx.

13. Riparian

Goal: Provide a diversity of riparian and aquatic habitats for maximum, sustained use by all associated wildlife.

14. Wildlife/Timber

Goal: Provide a diversity of wildlife habitats with near-optimal distribution and a sustained, even-flow of timber.

TABLE B-2

ACREAGES IN PRESCRIPTIONS BY ALTERNATIVES
(In Thousands of Acres)

	ALTERNATIVES									
	A Current Direction	B RPA	C	D	E	F	G	G Dep	H	I
Management Area 1	246.9	388.6	0	602.6	426.3	519.4	288.5	263.7	0	0
Management Area 2	0	28.0	5.5	77.0	56.7	32.1	10.0	33.3	23.5	0
Management Area 3	77.1	85.0	0	169.4	56.3	63.3	49.3	49.3	53.8	0
Management Area 4 & 4M	131.4	133.7	297.1	0	410.5	187.4	131.4	131.4	0	403.0
Management Area 5	274.2	87.5	231.4	174.2	0	0	119.2	119.2	0	82.8
Management Area 6	0	0	87.6	0	87.6	0	0	0	0	87.6
Management Area 7	87.6	87.6	0	0	0	87.6	72.5	72.5	87.6	0
Management Area 8	0.2	4.6	1.6	0.2	0.2	0.2	4.6	4.6	4.6	4.6
Management Area 9	89.2	79.6	137.0	0	0	125.1	82.7	82.7	236.1	81.2
Management Area 10	0	0	9.3	0	0	0	15.1	15.1	9.3	0
Management Area 11	0	0	4.9	0	0	4.9	4.9	4.9	4.9	0
Management Area 12	0	0	57.0	0	0	0	78.1	78.1	174.8	0
Management Area 13	0	12.6	0	0	0	12.6	12.6	12.6	12.6	12.6
Management Area 14	0	138.6	129.6	0	0	0	131.8	131.8	398.3	277.6
Management Area 15	626.2	626.2	626.2	626.2	626.2	626.2	626.2	626.2	626.2	626.2
Management Area 16	168.9	13.1	90.5	36.0	29.1	28.6	56.9	58.4	47.0	104.6
Management Area 17	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Management Area 18	0	0	0	0	0	0	0	0	0	1.7
Management Area 19	0	16.6	24.0	16.1	8.8	14.3	17.9	17.9	23.0	19.8

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3. Prescription Standard and Guideline Table

The following table displays a summary of the timber, range, recreation, wildlife, access and protection elements for each prescription.

TABLE B-3 - Prescription Comparison

Prescription	Timber	Range	Recreation	Wildlife	Access	Protection
1	Scheduled timber harvest, full yield	Range management to optimize forage production and utilization	Visual Quality is Modification in sensitivity level 1 areas and Maximum Modification in all others; recreation opportunities provided in a roaded modified or rural setting	Minimum deer cover amounts and 20% snag levels	Roads open to motorized vehicles at a density of 3 miles per square mile	Control
2	Scheduled timber harvest, reduced yield	Management activities to optimize range production and utilization	Visual Quality is Modification in sensitivity level 1 areas and Maximum Modification in all others; recreation opportunities provided in a roaded modified or rural setting	Minimum deer cover amounts and 20% snag levels	Roads open to motorized vehicles at a density of 3 miles per square mile	Control
3	No scheduled timber harvest; nonscheduled permitted to enhance range	Complex systems and management activities to optimize range production and utilization	Visual Quality is Modification in sensitivity level 1 areas and Maximum Modification in all others; recreation opportunities provided in a roaded modified or rural setting	Minimum management requirements	Roads open to motorized vehicles at a density of 2 miles per square mile	Contain

Prescription	Timber	Range	Recreation	Wildlife	Access	Protection
4	No scheduled timber harvest; nonscheduled sanitation and salvage on case-by-case basis	Livestock grazing permitted, but must conform with recreation	Visual Quality is Retention; nonmotorized recreation opportunities provided during summer or fall in an unroaded, natural setting	Minimum management requirements	Trail access only; no roads and no summer and fall motorized access	Confine
4M	No scheduled timber harvest; nonscheduled sanitation and salvage on a case-by-case basis	Livestock grazing permitted, but must conform to recreation	Visual Quality is Retention; motorized recreation opportunities provided year-round in predominantly natural appearing setting	Minimum management requirements	No new roads; existing roads maintained for 4-wheel ORV use. Designated trails maintained for motorized 2-wheel trail vehicles	Confine
5	Scheduled timber harvest; reduced yield; unit size constraints; percent of stands entered constraint	Livestock grazing permitted, but must conform with recreation	Visual Quality is Retention or Partial Retention; recreation opportunities provided in a roaded natural setting	Minimum deer cover amounts and 40% snag levels	Roads generally encourage highway vehicles; 3 miles per square mile maximum density	Control
6	No timber management activities	No domestic livestock grazing	Visual Quality approaches Preservation as nearly as possible; recreation opportunities provided in both an unroaded and roaded natural setting; no new developed sites	No habitat manipulation	Existing trails; no motorized	Confine
7	No scheduled timber harvest; nonscheduled permitted to enhance recreation	No domestic livestock grazing	Visual Quality is Retention; recreation opportunities provided in both an unroaded and roaded natural setting	Habitat improvement allowed	New roads and trails permitted; some ORV	Confine

Prescription	Timber	Range	Recreation	Wildlife	Access	Protection
8	No timber management activities	No domestic livestock grazing	Visual Quality is Retention; nonmotorized recreation opportunities provided in an unroaded natural setting	No habitat manipulation	Existing trails; no motorized	Apply strategy of surrounding area
9	Scheduled timber harvest, reduced yield	Domestic livestock grazing limited by percent use of forage	Visual Quality is Modification in sensitivity level 1 area and Maximum Modification in all others; recreation opportunities provided in a roaded modified or rural setting	Optimum deer habitat and 80% snag levels	Open roads less than 2 miles/sq. mile regulated to designated routes during winter and fawning seasons	Control with seasonal and intensity variations
10	No scheduled timber harvest; nonscheduled permitted to enhance mountain goat habitat	Livestock grazing avoided or discouraged	Visual Quality is Modification in sensitivity level 1 areas and Maximum Modification in all others; recreation opportunities provided in a roaded modified or rural setting	Optimum mountain goat habitat and 80% snag levels	Non-motorized and trails only	Confine
11	Scheduled or nonscheduled timber harvest permitted to enhance bighorn sheep habitat	No domestic sheep; other grazing will conform with wildlife objectives	Visual Quality is Modification in sensitivity level 1 areas and Maximum Modification in all others; recreation opportunities provided in a roaded modified or rural setting	Optimum bighorn sheep habitat and 80% snag levels	Motorized travel only on designated routes	Control with seasonal and intensity variations

Prescription	Timber	Range	Recreation	Wildlife	Access	Protection
12	Scheduled timber harvest, full yield	Livestock grazing must conform with wildlife objectives	Visual Quality is Modification in sensitivity level 1 areas and Maximum Modification in all others; recreation opportunities provided in a roaded modified or rural setting	Optimum lynx and other wildlife habitat and improve snag levels	Open roads less than 2 miles/sq. mile regulated to designated routes during winter	Control
13	Scheduled timber harvest; reduced yield; unit size and percent entry per decade constraints	Protection of streambanks and concentration in riparian avoided	Visual Quality is Modification in sensitivity level 1 areas and Maximum Modification in all others; recreation opportunities provided in a roaded modified or rural setting	Maximum wildlife and fish habitat and 100% snag levels	New roads only when necessary to cross	Control
14	Scheduled timber harvest, reduced yield	Livestock grazing must conform with wildlife objectives	Visual Quality is Modification in sensitivity level 1 areas and Maximum Modification in all others; recreation opportunities provided in a roaded modified or rural setting	Optimum wildlife habitat and 60% snag levels	Open road density less than 2 miles per sq. mile; motorized access limited	Control

Prescription	Timber	Range	Recreation	Wildlife	Access	Protection
15	No timber management activities	Livestock grazing on existing allotments	Visual Quality is Preservation; non-motorized recreation opportunities provided in a primitive setting	No habitat manipulation	Trails only; non-motorized	Confine all lightning fires, contain/control all person-caused fires
16	Mapping inclusions that are not suitable to be managed the same as the surrounding area. These areas will be managed in a way compatible with the surrounding area.					
17	No scheduled timber harvest; nonscheduled permitted to enhance recreation	Domestic livestock grazing excluded	Visual Quality is Modification; range of developed recreation opportunities provided in a roaded setting	Not managed for wildlife habitat	Roads developed and maintained to encourage highway vehicles	Control with 10 acre objective
18	No timber management activities	No domestic livestock	Visual Quality is Retention; non-motorized recreation opportunities provided in an unroaded natural setting	No planned habitat manipulation	No motorized access; pack stock on designated routes only	Confine
19	Scheduled timber harvest; reduced yield; no entry in existing old growth this decade	Domestic livestock grazing limited by percent use of forage	Visual Quality is Modification in sensitivity level 1 areas and Maximum Modification in all others; recreation opportunities provided in a roaded modified or rural setting	Manage old growth for 5% of potential amount and 80% snag levels	Motorized vehicles generally eliminated	Control

15. Wilderness

Goal: Provide a wilderness setting with access ranging from no trails to constructed trails.

16. Minimum Level

Goal: Meet basic stewardship responsibilities at minimum costs.

17. Developed Recreation Sites (including Ski Areas)

Goal: Provide a range of developed recreation opportunities in a roaded setting.

18. Botanical Area

Goal: Preserve an area containing specimens or group exhibits of plants, plant groups and plant communities which have botanical significance.

19. Old Growth

Goal: Provide coniferous old growth habitat for wildlife.

The following table presents the acreages by prescription for each alternative.

E. Development of Timber Options

Chapter III.D above describes the twenty prescriptions. It also discusses the relationship between the prescriptions and the Forest-wide Standards and Guidelines. This section will summarize the development of FORPLAN timber (modeling) prescriptions and their relationship to the management prescriptions. A more detailed documentation of the process can be found in the Forest Planning documents titled "Empirical Yield Tables," "Managed Yield Tables," and the FORPLAN "PNV With Detail" analysis.

1. Overview of Process

Once the management prescriptions were identified which were needed to address the Planning ICO's, the Interdisciplinary Team determined which of them could have their objectives achieved through scheduled (regulated) timber harvesting. Of the twenty management prescriptions depicted in Chapter III.D, nine of them included scheduled timber harvesting prescriptions which were analyzed within the FORPLAN model. These included:

a. Timber/Range
b. Range/Timber
c. Scenic Viewshed
d. Bighorn Sheep
e. Deer Winter Range
f. Timber/Wildlife (Lynx)
g. Riparian
h. Wildlife/Timber
i. Old Growth

The Wilderness, North Cascade Scenic Highway - Primitive, Botanical and the Research Natural Area Management Prescriptions do not permit any timber harvesting. The remaining areas permit timber harvesting on an unscheduled basis (for example in the event of catastrophic mortality). None of these management areas required the development of harvest scheduling prescriptions for FORPLAN.

Some key FORPLAN terminology is explained as follows. The FORPLAN prescriptions are identified and described in terms of "management emphases" and "management intensities." In most cases, the management emphasis name in FORPLAN is the same as the management prescription name used in the DEIS and Forest Plan. For example, "Deer Winter Range" is the name of a management prescription and a FORPLAN management emphasis. This is also true for the Developed Recreation and Old Growth Habitat management areas. However, the Scenic Viewshed management area is composed of two different management intensities in FORPLAN. These are (1) Retention and (2) Partial Retention.

The silvicultural options that were developed for each of the management emphases are referred to as "management intensities" in FORPLAN. They reflect the different combinations of practices, and the different timing choices for implementing those practices. In essence, they represent alternative investment levels in timber management to achieve the objectives of a management area. The list below depicts some of the management practice terms used to help describe the various management intensities considered for each management emphasis. Not all practices that will be implemented as part of a prescription are included in this list.

Management Practices

Natural Regeneration
Plant
Precommercial Thin
Commercial Thinning
Overstory Removal
Shelterwood
Clearcut, Shelterwood or Seedtree
Group Selection (uneven-aged management)

A range of silvicultural prescriptions was developed and analyzed for each working group and management area combination. This included the development of both empirical and managed yield tables. The empirical yield tables are used to portray alternative silvicultural treatment options for existing mature sawtimber and immature pole stands. They are called empirical because they are based in part on Continuous Forest Inventory (CFI) plot data. The managed yield tables apply both to existing seedling/sapling stands and to future managed stands which result from the regeneration harvesting of existing natural stands. Low productive working group yields were based upon "steady state" management. Inventory and growth were derived from data collected on intensive ecology plots. The silvicultural prescriptions and their associated yield tables were developed based on the silvilcultural characteristics of each working group and the stand management objectives for each individual management area.

Once the vegetative management objectives were identified for each management area, the appropriate Interdisciplinary Team members worked together to develop a range of harvest scheduling options. The overriding criteria in this process was that the silvicultural prescription and its associated yield table achieve the vegetative management objectives for the management area in a cost effective manner. A range of scheduling choices, rotation ages and investment levels were examined and made available to the FORPLAN model. For example, the model was given four different silvicultural regimes to choose from when deciding how to manage regenerated lodgepole pine stands in the Timber/Range Management Area. Each had different schedules of silvicultural practices, spacing arrangements and rotation lengths. All of them achieved the objectives of the Timber/Range Management Area.

In some cases it was necessary to reduce the number of prescriptions included in the FORPLAN model in order to keep it within maximum size limits. For this purpose, the range of available prescriptions for a particular management area were examined. Present net values (or soil expectation values for managed stands) were calculated for each. Those which were less efficient and/or did not contribute significantly to the range of reasonable harvesting options were dropped.

Finally, situations developed in which the vegetative management objectives for a management prescription were so specific that the range of silvicultural regimes that could achieve those objectives was very limited. This was probably most true for the Deer Winter Range and Old Growth Habitat management prescriptions.

2. Range of Timber Management Options Considered

As discussed in Chapter II.A, analysis areas in suitable forest lands were delineated in part by four working group identifiers (Productive Moist, Productive Dry, Productive Lodgepole and Low Productive) and five existing vegetative condition classes (Regeneration, Seedlings/Saplings, Immature Poles, Mature Sawtimber and Two-Storied Stands).

Low productive stands are not capable of producing 20 cubic feet per acre per year at culmination of mean annual increment (CMAI). Stands in the productive lodgepole, productive moist and productive dry working groups are all capable of producing at least 20 cubic feet per acre per year CMAI. These analysis area identifiers depicted stands which were classified as suitable and available lands for timber harvesting. FORPLAN timber management prescriptions were developed for every combination of management emphases which called for scheduled harvesting and analysis areas and contained suitable and available forested land. For any one prescription, the model was also offered several timing choices on when to implement it. Also, for each management emphasis and analysis area combination which involved timber harvesting options, the model could also select a prescription which called for no programmed harvesting. This prescription was used as the final economic suitability test. All in all, FORPLAN could select from any of 60,000 to 80,000 prescription/timing choice options to meet its objectives for a particular alternative.

Based on an analysis of the CFI plot data, the immature, mature and two-storied analysis areas were stratified according to their existing inventory characteristics. Likewise, the silvicultural prescriptions and their associated yield tables that were developed for these analysis areas were based on regression analyses of the same data plus professional judgment. As would be expected, the older the stand, the fewer the silvicultural options that were realistically available to manage it. Because of stand history, existing insect and disease conditions and silvics of timber species options for future management of existing pole and sawtimber stands are somewhat limited. Lack of past stocking control prevents commercial thinning from being a realistic option. The majority of existing stands will be regenerated at an appropriate time.

Managed yield tables were employed for prescriptions involving analysis areas in the regeneration or seedling/sapling condition, and for future managed stands resulting from the regeneration of existing natural stands.

The prescriptions included in the FORPLAN model covered a wide range of timber management options:

a. Regenerate - Harvest

b. Regenerate - Precommercial Thin - Harvest

c. Regenerate - Precommercial Thin - Commercial Thin - Harvest

d. Regenerate - Precommercial Thin - Commercial Thin - Commercial Thin - Harvest

Precommercial and commercial thinnings were of various intensities. Commercial thinning without prior precommercial thinning was investigated but was not among the options available for FORPLAN because of low yield, high cost and operational problems. Precommercial thinning in existing seedlings/saplings is feasible only in specific situations. Many stands of this size and condition class resulted from past fires. Access is often poor or undeveloped. Existing fuel loadings are often high. Many stands are diseased and have limited ability to respond to thinning. Because FORPLAN capacity for handling existing vegetation is limited, precommercial thinning existing stands was not modeled. Acres of precommercial thinning during the first two decades was estimated outside of FORPLAN based upon acres of seedling/sapling condition class, acres of recent regeneration harvest and historical precommercial thinning levels. No earned harvest effect was attributed to precommercial thinning estimated for each of the first two decades.

Overstory removal cutting from existing timber stands was not modeled. Between 10% and 20% of existing two story stands are believed to contain understory stocking capable of responding to release following overstory removal cutting. Because of the relatively small number of acres involved, limitations on the number of timber prescriptions we could enter into FORPLAN, and the fact that overstory removal becomes less feasible in existing stands beyond the first decade, overstory removal cutting was not modeled.

The full range of management intensities was available for the Timber/Range, Timber/Wildlife and Wildlife/Timber management emphases. The other management emphases were usually restricted to silvicultural regimes designed to achieve specific resource objectives such as wildlife habitat or scenic viewsheds. See Managed Yield Table Documentation on file in the Forest Supervisor's Office for details of the analysis.

F. Development of Per Acre Yield Coefficients

The Okanogan National Forest developed its first FORPLAN model during the summer of 1980. It has evolved through several versions and modeling philosophies since then. FORPLAN evolved to consist primarily of a wide range of harvest scheduling prescriptions which were designed to achieve the multiple use resource management objectives associated with the various management area choices.

This section summarizes the processes used to develop the resource outputs and effects coefficients used in the final version of the FORPLAN model. Also the development of the recreation supply and consumption coefficients will be discussed. While the timber, recreation and wildlife resources were at the heart of many planning issues and together accounted for most of the present net value associated with any of the alternatives, the outputs and effects of many other resources were also evaluated for each alternative. These include the minerals, range, soils, visuals and water resources. The development of the coefficients for range, visuals and water resources are discussed below. The other resources will not be covered in this discussion. For the details regarding these resources, refer to process records in the Supervisor's Office.

Finally, the process for developing the economic cost and benefit coefficients for the FORPLAN prescriptions will be presented in Section IV of this Appendix.

1. Timber Yield Coefficients

The development of timber yield tables was an important step in the Okanogan National Forest Planning process. They are a component of the FORPLAN model which is used to calculate the allowable sale quantity, long run sustained yield and schedule of timber harvest activities. Wildlife biologists, landscape architects, economists, silviculturists and timber management personnel at the Ranger District, Forest and Regional Office levels were involved in the process. The yield tables were reviewed for reasonableness at several points. District, Forest and Regional Office personnel were involved in yield table review. Specific details on development of timber yield tables are on file in the Forest Supervisor's Office.

Yield coefficients were developed for all management area prescriptions and analysis area combinations which permitted regulated timber harvest scheduling. Managed and empirical yield tables were developed for productive forest stands in the productive moist, productive dry and productive lodgepole working groups. The productive moist and productive dry working groups were combined into a single mixed conifer working group for the purpose of developing managed yield tables. Low productive working group yields were computed separately. Development of timber yield tables will be discussed separately in the following sections.

a. Timber Yield Coefficients for Existing Sawtimber and Pole Stands

The purpose of empirical yield tables is to estimate the existing immature and mature standing inventory of wood fiber on a per acre basis and to predict how it would grow according to weighted average site conditions and specified silvicultural regimes. Empirical yield tables were developed for productive moist, productive dry and productive lodgepole working groups. The predicted volumes pertain to live green wood in trees 7 inches diameter breast height (D.B.H.) and larger to 4-inch tops. The volume tables are calculated in cubic feet. The associated cubic foot yield coefficients were entered into the relevant FORPLAN prescriptions. The cubic foot outputs from FORPLAN were later converted to Scribner Decimal C Board feet based on working group and diameter class specific conversion ratios. Empirical Yield Tables were developed based upon data collected from the 1977

Continuous Forest Inventory. Data were stratified by working group, stand type and tree size class. The effects of endemic insect and disease populations are inherent in the data and therefore in the yield projections. No attempts were made to account for future catastrophic losses to insects, disease or fire. In all, ten yield tables were developed for existing sawtimber and pole stands. Because of inventory design and FORPLAN model size limitations, stands that had previously been precommercially thinned were aggregated with unthinned stands during development of empirical timber yield coefficients. Timber yields for existing seedling/sapling stands were modeled in FORPLAN with low intensity managed yield tables. While experience demonstrates that local timber stands respond to management in a manner similar to that described in the literature, very little local research is available. Timber yield tables and stocking curves may or may not applyto local species and stands. Yields were adjusted for snag replacements required to maintain various cavity nester (snag dwelling) populations according to management area emphasis. Information on adjustments to empirical yields is in Snag Documentation on file in the Forest Supervisor's Office. Additional details on yield table development can be found in the Forest Planning Document titled "Empirical Yield Tables."

b. Timber Yield Coefficients for Managed Stands

The purpose of managed yield tables is to estimate the future inventory of wood fiber in existing seedling/sapling stands and in future managed stands on a per acre basis and to predict growth according to weighted average site conditions and alternative silvicultural regimes. Yield tables were developed for all management areas which permit regulated timber harvest scheduling. Productive moist and productive dry working groups were combined for the purpose of developing managed yield tables. A separate set of tables was developed for the productive lodgepole working group. They were calculated and entered into FORPLAN as cubic feet per acre coefficients. Managed yield tables were developed for each working group which projected timber yield under various silvicultural regimes. Tables were also developed to model yields from stands managed to provide special wildlife habitat requirements, to provide for visual quality objectives, and to provide range forage. These special yield tables resulted in varying reductions in yield depending on rotation length and stocking density. The effects of endemic insects and disease were imbedded in data used to develop yield simulators. No data existed to adjust juvenile stocking and growth for the effects of animal damage. Likewise, no effort was made to adjust managed yield projections to account for catastrophic losses from fire, insects or disease. Since future managed stands are likely to be thrifty, insects and disease are likely to be a minor consideration. A more in-depth discussion can be found in the Forest Planning Document titled "Managed Yield Tables."

Adjustments To Simulator Yield Projections

(1) Fertilization

Because of (1) soil and climatic conditions on the forest, (2) the high price and uncertainty of future fertilizer supplies, and (3) the lack of fertilizer trials which establish positive economic benefits to fertilization of forest sites, managed timber yield tables were not adjusted for fertilization.

(2) Planting with Genetically Improved Stock

The choice of planting versus natural regeneration was based on working group and land class. For the mixed conifer working group, planting was assumed to occur in approximately half of the regenerated stands. For lodgepole pine and low productive stands, all reforestation is assumed to be by natural regeneration. Growth increases resulting from use of improved planting stock were estimated based upon review of relevant literature (Theisen 1980). Local data and research were not available.

In light of limited empirical data regarding the effects of genetically improved stock on the growth and yield of managed stands, Regional direction was to assume an across the board increase in yield of 10 percent for all stands where genetically improved stock will be planted. Approximately 85 percent of future plantings will be with stock from the forest tree improvement program.

(3) Wildlife Trees - Yield Reductions to Provide Cavity Nester Habitat (Snags)

Wildlife tree management goals are based on the concept of maximum potential population for primary excavator species (woodpeckers) (Thomas 1979).

Managed yield volumes were adjusted to reflect the volume reserved from managed stands to provide adequate snag numbers and sizes throughout the rotation. This includes those trees retained at rotation to provide snags until the managed understory is of the appropriate size to satisfy wildlife tree needs. During the remainder of the rotation, trees from the managed stand will provide adequate snag numbers and sizes. Snag numbers were calculated on the basis of 320 acres.

Managed yield volume reductions are based on four variables:

(a) the number of snags per acre required for specific levels of maximum potential population,

(b) the number of green wildlife trees (snag replacements) required, as determined by the rotation age and the average snag standing life,

(c) the volume per tree reserved, and

(d) the competitive effect of wildlife trees on the regenerated stand.

The competitive effect of live wildlife snag replacement trees on managed stands was modeled using the concept of a limited biological potential for cubic foot volume growth of forest stands. We assumed that all managed yield strategies would maintain full site occupancy during their respective rotations. Sites occupied by snag replacements were not available to crop trees for growth or increment. Details on adjustments to timber yields are found in Snag Adjustment Documentation on file in the Forest Superivisor's Office.

(4) Breakage and Defect

To reflect the losses in commercial volume due to breakage and defect, all thinning and final harvest entries in the managed yield tables were reduced. The reduction varied by tree size and stand density. See managed yield table documentation on file in the Forest Supervisor's Office.

(5) Nonstockable or Nonstocked Openings

Yield simulator volume projections were adjusted to reflect land areas included within timber stands which are not stocked with commercial tree species. The adjustment varied by working group and management intensity.

c. Timber Yield Coefficients for Low Productive Stands

Limited data is available on either inventory or growth in low productive stands. The 1977 Forest Inventory excluded all stands classed as "Unproductive." In general this included all stands which might now be classed as "Low Productive." Intensive ecology plots were located with little regard for "Productive/Unproductive" classification. Several plots were placed on lands not capable of producing 20 cubic feet per acre per year at culmination of mean annual increment. Inventory was estimated from existing volume on ecology plots. Conventional yield simulators are not designed to project yields from lands of very low productivity. Therefore, annual growth was estimated based upon a "steady state" yield philosophy. Growth was estimated using mean annual increment equations (Teply 1971) and Stand Density Index (Reineke 1933). A detailed discussion of procedures is on file in the Forest Supervisor's Office.

2. Recreation and Wilderness Consumption Coefficients

A detailed discussion of the process used to develop expected recreation and wilderness visitor day outputs can be found in the Forest Planning document titled "Process for Developing Recreation and Wilderness Yield Tables." A summary of the process is described below.

Current annual use was determined for developed sites, wilderness and other dispersed areas.

Future expected developed site use was determined using projected demand for developed recreation for Districts 3 and 7 from the Washington Statewide Comprehensive Outdoor Recreation Plan (SCORP). The expected use from the proposed Early Winters Ski Area development was then added for each decade to arrive at total expected developed site use under a recreation management emphasis. Total expected developed site use was decreased 5 percent under a wildlife emphasis and 10 percent under a timber management emphasis.

For wilderness use, current use on a per-acre basis was determined by dividing total use in the Pasayten and Lake Chelan/Sawtooth Wildernesses by the total wilderness acreage. The per-acre coefficients were converted to per-acre per-decade coefficients. Future expected per-acre per-decade coefficients were determined using projected demand for wilderness activities for Districts 3 and 7 from the Washington SCORP.

For other dispersed areas, current use was spread over suitable and unsuitable land assuming 75% occurs on suitable land and 25% occurs on unsuitable land for the following categories of analysis areas:

> Roaded, Not Visually Significant (roaded with inventoried visual quality objectives of modification and maximum modification).
>
> Roaded, Visually Significant (roaded with inventoried visual quality objectives of retention or partial retention).
>
> Unroaded

For recreation use on roaded, non-visually significant analysis areas, per-acre coefficients were developed based on the wildlife and slope characteristics of the analysis areas. The per-acre coefficients were then converted to per-acre per-decade coefficients. No adjustments were made between timber, wildlife or roaded recreation management emphases. Future expected per-acre per-decade increases were determined using projected demand for roaded recreation activities for Districts 3 and 7 from the Washington SCORP.

For recreation use on roaded, visually significant analysis areas, per-acre coefficients were developed based on whether the analysis area was inventoried as having high (retention) or moderate (partial retention) visual quality objectives. The per-acre coefficients were then converted to per-acre per-decade coefficients. A roaded recreation management emphasis would give full yields, while a wildlife or timber management emphasis would decrease per-acre coeffcients by 10 percent and 25 percent respectively. Future expected per-acre per-decade increases were determined using projected demand for roaded recreation activities for Districts 3 and 7 from the Washington SCORP.

For recreation use on unroaded analysis areas, per-acre coefficients were developed based on whether the analysis area had high-moderate (retention or partial retention) or low (modification or maximum modification) visual significance and slope characteristics. The per-acre coefficients were then converted to per-acre per-decade coefficients. An unroaded recreation management emphasis would give full yields. A roaded recreation management emphasis would increase the per-acre coefficient by 10 percent, while a wildlife or timber management emphasis would decrease the per-acre coefficient by 10 percent and 25 percent respectively. Future expected per-acre increases were determined using projected demand for unroaded recreation activities for Districts 3 and 7 from Washington SCORP.

For recreation use on unsuitable analysis areas, per-acre coefficients were determined by dividing the total use on unsuitable land by the acres of unsuitable land. The per-acre coefficient was converted to a per-acre per-decade coefficient. An unroaded recreation management emphasis would give full yields. A roaded recreation management emphasis would increase the per-acre coefficient by 5 percent, while a wildlife or timber management emphasis would decrease the per-acre coefficient by 5 percent and 10 percent respectively. Future expected per-acre increases were determined using projected demand for unroaded recreation activities for Districts 3 and 7 from Washington SCORP.

3. Wildlife Coefficients

Cover (snow intercept thermal), old growth and large snags were modeled as scheduled outputs in FORPLAN. Empirical yields from previously mentioned "Sources of Data" (Chapter II.B.) were apportioned to appropriate analysis areas. Managed yield tables were based on the structural characteristics of trees and stands which provide these habitat values, and constructed to produce yields at ages when the structural characteristics were estimated to occur. Sedimentation was also a scheduled output with yields sensitive to roading and timber harvest.

Habitat capability in terms of numbers of animals was calculated outside of FORPLAN, using reports and scheduled outputs from the model as the basis for estimates. Capability for mule and white-tailed deer was estimated primarily from amounts of snow intercept thermal cover on winter range, tempered by accessibility and forage amounts.

Capability for old growth/mature indicator species used old growth (a scheduled output) and mature conifer amounts (from inventory reports) as the primary determinant, tempered by general snag levels.

Capability for primary cavity excavators (woodpeckers) was based on estimated snag levels. Numbers of large snags (scheduled output) and area allocated to management emphases (FORPLAN report) reflect long-term trends for woodpecker populations.

Capability for fish varied with the amount of sedimentation (scheduled output).

Capability for lynx used amount of seedlings, saplings and poles (from inventory reports) as the key determinants tempered by amount of roading.

Capability for ruffed grouse was based on acres allocated to riparian and other wildlife emphases.

Diversity of animal communities was based on a composite ranking of the alternatives and ability of each to provide habitat capability for the above mentioned wildlife.

FORPLAN was constrained in certain runs to produce various amounts of snow intercept thermal cover and old growth habitat.

4. Range Coefficients

Range coefficients are based on the range analysis completed in the late 1950's and early 1960's. Since then, adjustments in stocking livestock numbers have been made based on annual utilization studies. An allowance was also made for forage and browse use by wildlife. Permanent line transects are used to follow up on range condition and trend. Though analysis may show areas unsuitable for livestock grazing, it is not practical to map them out of an allotment.

5. Water Coefficients

Sediment has consistently been identified as the most significant pollutant resulting from timber harvesting. Sediment is produced from forest lands by surface erosion, mass soil movement and channel erosion. Logging road activities influence sedimentation the most of all of the sediment contributers on the Okanogan National Forest.

Field studies and observations, along with the research results, concludes sediment production estimates from road construction provides the most meaningful index of soil and water impacts from management alternatives.

Techniques for accurately calculating the quantity of soil surface erosion and delivered sediment on a forest scale have not been developed; however, modeling techniques which provide relative differences in these parameters between forest management alternatives are available.

Universal Soil Loss Equation

The Universal Soil Loss Equation (USLE) developed by Wischmeier and Smith estimates long-term average soil surface erosion on agricultural lands. This equation has been modified for use on forested lands to predict sheet and rill erosion resulting from vegetative manipulation and road construction activities (Curtis and others 1977, Darrach and others 1978).

Several limitations must be considered when using the USLE. Road cut and fill slope gradients often exceed the limits of the data base from which the equation was developed. Slopes exceeding 20 percent provide surface erosion estimates which are unverified by actual measurements. The USLE does not predict short-term erosional losses since these are generated through random fluctuations in equation variables. The USLE does, however, provide relative predictions of soil surface erosion resulting from various management practices.

The USLE, as modified for use on forested lands, is

$$A = R \times K \times L \times S \times C$$

where A is the predicted on-site erosion expressed in tons per acre per year, and

R = total annual rainfall factor
K = soil erodibility factor
L = slope length factor
S = slope gradient factor
C = vegetative cover factor

Each of these factors is described below.

Rainfall Factor (R)

The rainfall factor is the sum of total raindrop energy and its relation to the maximum 30-minute storm intensity for a year. Precise rainfall factors for representative sites within forest management areas are not known. Average factors for forest watersheds were estimated from the isoerodent map of Washington. The rainfall factors for forest watersheds are shown in Table B-4.

TABLE B-4 - Rainfall Factors and Average Sediment Delivery Ratios for Okanogan National Forest Management Areas

Management Area	Rainfall Factor	Delivery Ratio
Suitable Forest Land, Roaded, <30% slope	30	5
Suitable Forest Land, Roaded, 45% slope	30	10
Suitable Forest Land, Roaded, >60% slope	30	20
Suitable Forest Land, Unroaded, <30% slope	30	5
Suitable Forest Land, Unroaded, 45% slope	30	10
Suitable Forest Land, Unroaded, >60% slope	30	20
Deer Winter Range, Roaded, <30% slope	25	5
Deer Winter Range, Roaded, 45% slope	25	10
Deer Winter Range, Roaded, >60% slope	25	20
Deer Winter Range, Unroaded, <30% slope	25	5
Deer Winter Range, Unroaded, 45% slope	25	10
Deer Winter Range, Unroaded, >60% slope	25	20
Wilderness Current Sediment Level and North Cascades Scenic Corridor	75	25

Soil Erodibility Factor (K)

The soil erodibility factor provides a relative index of the soil's resistance to surface erosion. The soil characteristics which most influence erodibility are soil structure, texture, permeability and organic matter. Soils on the Okanogan National Forest exhibit little diversity in these physical properties. Soils are generally sandy loam to loamy sand in texture, single grained, have moderate to high permeability and low organic matter content.

Small areas of fine-textured, surface soils of lacustrine origin do exist, but are marginal at overall levels. A factor of 0.24 is assumed for soils on the forest.

Slope Gradient and Slope Length Factors (L, S)

Water velocity increases as slope steepness and distance of surface flow increase. Increases in water velocity result in greater water energy for detachment of soil particles and this interim increases soil surface erosion. Slope length is the distance from the origin of overland flow to the point of deposition. For estimating surface erosion rates, appropriate slope lengths and gradients of standard logging roads are used.

Vegetative Cover Factor (C)

The cover factor reflects the effect of ground cover on soil surface erosion rates. Vegetative cover factors are generated through consideration of canopy cover, percent bared soil and effective ground cover.

Cover factors for newly bared areas, such as road cut and fill slopes, are generally high (near 1.0) and decrease with time as the finer soil particles are eroded away and vegetation becomes established.

Actual cover factors for road cut and fill as a function of time are not known for the Okanogan National Forest, however reasonable estimates can be made from literature values. Newly constructed roads and existing roads are assumed to have cover factors of 0.8 and 0.2 respectively.

Road Mileage

Road construction is the single most important cause of increased sedimentation from management activities. Road miles indicate the management intensity on a given management area. Total sediment production by decade will reflect the road construction activity.

Road miles were estimated by the forest transportation planner for various timber yarding methods (tractor, cable, helicopter). These were expressed as miles per acre. Road construction for other uses (recreation use, range use only, recreation trails or other limited activities) were not considered for the analysis unless the roads were already in place.

On-Site Sediment Production

On-site soil surface erosion is estimated by the USLE and were expressed in tons per acre per year.

Watershed Delivery Ratios

A sediment delivery ratio was estimated for each slope class and rainfall intensity (Table B-3) using Water Resources Evaluation of Non-Point Silvicultural Sources (1980) procedures as a guide. The delivery ratio represents the portion of on-site sediment production deposited into the surface water drainage system. The introduced sediment eventually moves through the drainage system.

On-site factors that affect sediment delivery ratios include slope gradient, soil infiltration rate, length of slope, density of streams, distance to streams and slope shape.

Off-Site Sediment Production Coefficients

The off-site sediment production is the product of the sediment delivery ratio and the on-site sediment production. This is the coefficient that is used for the variety of landscapes and conditions projected in the Forest Plan. Table B-5 lists the coefficients. There is a current, short-term increase, re-entry increase and long-term level of sediment production. Current represents the existing condition and includes current road mileages when the area is roaded. If the area is unroaded, sediment production is considered natural rate. Timber harvest itself is not included because the sediment impacts from timber harvest itself appear to be generally insignificant compared to road construction on the Okanogan National Forest, and timber removal sediment impacts are short lived (1-2 years). Timber removal sediment impacts averaged over a decade would essentially be equal to natural rates.

Road construction's short-term sediment impact is the largest increase of off-site sediment production immediately following management. The short-term impacts last 1-3 years and do not represent a decade average. The short-term sediment increase value represents a conservative estimate for the decade where the management activity occurs.

Increased sedimentation from re-entry into an already managed area will be greater than long-term sediment production but less than short-term sediment increase from new road construction. Subsequent entries are estimated to be 50 percent of the initial entry sediment production. The short-term sediment impact will last three years, as does the re-entry increase.

Long-term sediment production represents an increase of sediment production over the rotation length and natural undisturbed conditions. Old roads normally contribute an accelerated amount of sediment several decades past initial construction. The magnitude of impact greatly reduces after initial construction, but there is a higher sediment production rate than the natural background rate.

TABLE B-5 - Sediment Production Coefficients for Analysis Areas on the Okanogan National Forest

Analysis Areas	Roads to Be Built	Current Level	Short-Term Increase	Re-entry Increase	Total Long-Term
	(mi/ac)	(	Tons per Acre	per Year	)
Roaded, Suitable, <30%	.002	.154	.026	.013	.168
Roaded, Suitable, 30%-60%	0	.299	.059	.030	.299
Roaded, Suitable, >60%	0	.97	.57	.285	.97
Unroaded, Suitable, <30%	.007	.14	.057	.029	.168
Unroaded, Suitable, 30%-60%	.005	.24	.237	.119	.299
Unroaded, Suitable, >60%	.005	.40	2.281	1.141	.97
Roaded, DWR, <30%	.002	.118	.022	.011	.13
Roaded, DWR, 30%-60%	0	.249	.05	.025	.249
Roaded, DWR, >60%	0	.805	.48	.024	.805
Unroaded, DWR, <30%	.007	.11	.047	.024	.13
Unroaded, DWR, 30%-60%	.005	.20	.198	.099	.249
Unroaded, DWR, >60%	.005	.33	1.901	.951	.805
North Cascades Scenic Area	.005	.99	7.129	3.565	2.772

6. Visual Coefficients

Visual resource coefficients were based on the Inventoried Visual Quality Level of the Analysis Areas and when resource management activities would take place.

All analysis areas outside wilderness were assigned Visual Quality Levels of High (Retention), Moderate (Partial Retention), or Low (Modification or Maximum Modification).

Future Visual Quality Levels were based on when management activities would occur. The first activity (roads or harvest entry) would change the Inventoried Visual Quality Level. Resulting acres are reported as a scheduled output.

FORPLAN was constrained to produce various amounts of Retention and Partial Retention Visual Quality Levels. The remaining acres would result in Visual Quality Levels based on the various management emphases of the alternatives.

IV. ECONOMIC EFFICIENCY ANALYSIS

This section describes the costs and benefits, as well as some concepts involved in economic efficiency analysis, how they were derived, and how they were used in the Forest Planning process. Economic efficiency analysis is required by the National Forest Management Act Regulations (36 CFR 219) and played an important role in the development and evaluation of Forest Planning benchmarks and alternatives. Specifically, the regulations (36 CFR 219.12[f]) state that:

> "The primary goal in formulating alternatives, besides complying with NEPA procedures, is to provide an adequate basis for identifying the alternative that comes nearest to maximizing net public benefits."

This is followed in 36 CFR 219.12(F)(8) by stating that:

> "Each alternative shall represent to the extent practicable the most cost efficient combination of management prescriptions examined that can meet the objectives established in the alternative."

A. Descriptions of Some Concepts Related to Efficiency Analysis

A few concepts and terms related to economic efficiency analysis need to be explained before discussing how the Okanogan National Forest "assured the economic efficiency" of the proposed practices.

1. Priced Outputs (Benefits)

Priced outputs are those that are or can be exchanged in the market place. Their quantitative values are determined by actual market transactions or by estimation methods that produce prices commensurate with those determined by market transactions. Timber, developed recreation, forage and minerals are examples of commodities which are bought and sold in the market. Their values are determined through the interaction of buyers and sellers based on the supply and demand conditions in the market at the time of the transaction. On the other hand, recreation opportunities outside developed sites in conjunction with the visual resource are not normally exchanged via market transactions. Their market values are estimated by using some market transaction data in combination with various theoretical techniques.

Conceptually, these assigned values should be consistent and comparable to those values which were actually derived via market transactions (Rosenthal and Brown 1985). Therefore, both assigned and market values for priced outputs are appropriate to use for calculating quantitative measures of efficiency such as present net value (see 1985 RPA Market and Non-market Benefit Value procedures).

2. Non-priced Outputs

Non-priced outputs are those for which no available market transaction evidence is available and no reasonable basis is present for estimating a dollar value commensurate with the market values associated with the priced outputs. In these cases, subjective non-dollar values must be attributed to their production. These values are qualitatively described rather than quantitatively. They may be either positive or negative. In fact, what may be considered to be a benefit to someone may represent a cost to someone else. Examples of non-priced outputs include the maintenance or enhancement of threatened and endangered species, natural and scientific areas, historical and anthropological sites, water quality, and clean air.

3. Discounting

Financial analyses of alternative investment options usually involve cash flows over different periods of time in the future. Inherently, there is a time value associated with money. A dollar today is worth more than a dollar ten years from now. Discounting is a process for adjusting the dollar values of costs and benefits which occur at different periods in the future to dollar values for a common time period so that they may be compared. Usually the common time period is the present, in which case, the discounted cash flow is referred to as the present value. The Regional Planning Direction, 1920 memo of November 10, 1983 is the basis used for determining discount rates.

4. Present Net Value

Present net value (PNV) is the difference between the discounted value (benefits) of all outputs to which monetary values or established prices are assigned and the total discounted costs of managing the planning area. The maximization of present net value was the criterion used to help assure that each alternative was the most economically efficient combination of outputs and activities needed to meet the objectives established for that alternative. Present net value calculations consider only the benefits for which market prices exist or can be assigned. On the Okanogan, the priced benefits included timber, recreation and wilderness opportunities, wildlife, special uses and range. These were compared against all Forest Service fixed and variable costs associated with managing the planning area, regardless of whether they were incurred for the production of either priced or non-priced outputs, or as overhead expenses for general maintenance of the organization. Therefore, PNV is an estimate of the current market value of the priced forest resources after all costs of producing both priced and non-priced outputs and meeting other multiple-use objectives have been considered.

5. Opportunity Costs

Opportunity costs are defined as the value of a resource's foregone net benefit in its most economically efficient alternative use (FSM 1970.5). In relation to the economic analysis performed for Forest Planning, it represents the decrease in maximized PNV from an alternative in relation to one that has a higher PNV. This occurs when some alternative level of resource outputs come into solution to meet a different set or mix of goals and objectives. Therefore, opportunity costs measure the change in PNV for priced resource outputs, and can be used to measure the relative value traded off in order to produce the non-priced benefits and/or a different mix of priced benefits to achieve non-economic goals included in net public benefits.

6. Net Public Benefits

The maximization of net public benefits (NPB) is a goal of the Forest Planning process. Net public benefits is the overall value to the nation of all outputs and positive effects (benefits) less all the associated Forest Service inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits cannot be expressed as a numeric quantity because it includes qualitatively valued non-priced outputs.

Conceptually, net public benefits is the sum of the present net value of priced outputs plus the full value of all non-priced outputs. The full value of non-priced benefits is used because the costs associated with their production is accounted for in the calculation of PNV. It is only necessary to identify the marginal values of non-priced outputs when management inputs are increased in order to provide these outputs at levels above current standards or legal requirements. In such cases, it is important to depict the physical, biological and social dimensions of the non-priced outputs, as well as who will benefit and who will suffer from their production. Account should also be taken of any changes that may occur among the other non-priced outputs as a result of providing a particular non-priced output. In assessing the net public benefits of a particular alternative, it is necessary to judge whether the subjective value to society of its non-priced outputs exceeds the opportunity costs associated with their production.

7. Welfare Distribution Effects and Impacts

There is another level of effects which are also a concern of National Forest policy and management. These are the welfare distribution effects influenced by the mix and level of outputs produced by the National Forest. They can be either positive or negative. Their impacts can also be local, regional or national in scope. Some distributive effects such as changes in consumer prices or taxpayer costs have national level impacts. Others, such as induced jobs and income, or payments in lieu of taxes are more local or regional in nature. They are more related to questions of equity (i.e. who pays and who benefits) rather than efficiency. They are not assessed in the context of the efficiency criteria associated with the PNV and net public benefit concepts. However, these positive and negative distributive effects need to be assessed in conjunction with the net public benefit measures since equity objectives often influence efficiency objectives and vice versa.

B. Parameters and Assumptions Used For Economic Efficiency Analyses

In order to calculate the present net value for each alternative, several assumptions had to be made regarding discount rates, demand curves, real dollar adjustments, and real price and cost trends. This section will summarize these decisions and their resulting parameters. A more detailed discussion can be found in various process records in the Supervisor's Office.

1. Discount Rates

Discounting requires the use of a discount rate which is an interest rate that represents the cost or time value of money in determining the present value of future costs and benefits. Two discount rates were used to calculate the present net values for each benchmark and alternative. Both of them were real discount rates, meaning that they were adjusted to exclude the effects of inflation. (Real dollar adjustments will be discussed more below.) According to FSM 1971.71:

> For evaluations of long-term investments and operations in land and resource management in the planning period, a 4-percent real discount rate shall

> be used. Evaluations should also discount benefits and costs at the real discount rate used in the most recent RPA to determine sensitivity of alternatives to variations in the discount rate.

The 4 percent rate approximates the "real" return on corporate long-range investments above the rate of inflation (Row, Kaiser and Sessions 1981). The 4 percent rate was used to solve FORPLAN and calculate the PNV for each benchmark and alternative. The 1985 RPA program used a real discount rate of 7-1/8 percent. An analysis of the sensitivity of the alternatives and benchmarks to the discount rate was performed by solving FORPLAN using both the 4 percent and the 7-1/8 percent discount rates. Finally, all costs and benefits were discounted from the midpoint of the decade in which they were incurred.

2. Demand Curves and Real Price Trends

As specified by the Washington Office (1920 letter to Regional Forester, "Downward Sloping Demand Curves," 2/3/81) and in keeping with FSM 1971.65, horizontal demand curves for timber and nontimber resources were used to analyze the benchmarks and alternatives for the DEIS. Many factors can influence the demand for stumpage off of any one forest (Adams and Haynes 1985). Some of these factors include trends in (1) interest rates, (2) the species and products mix of forest products consumption, (3) use of wood for energy, (4) forest products exports, (5) the cost of wood in Canada, (6) the rate of technical improvements in wood and fiber processing, and (7) the levels of other national forests' harvests. All of these contain some degree of uncertainty regarding their future states of nature. Neither the empirical nor the theoretical bases have been well enough developed to derive reasonable estimates of the demand functions for the resources offered at the forest level. Evidence does exist, however, that suggests that the elasticity in the portion of the timber demand curve for which the forest can influence output levels is such that prices would be relatively insensitive to some "reasonable" range of quantity offerings. In other words, it appears that the timber demand curve for the range of ouput levels analyzed during the development of alternatives is nearly horizontal.

As a surrogate for resource demand curves, real price trends were developed and used to represent the rate at which resource values will change over time as a result of anticipated supply and demand interactions in the market place. As specified by the Regional Office (1920 letter to Forest Supervisors, "Timber Price Trends, Values and Costs," 9/25/84), a 1 percent per year real price trend for stumpage was used for FORPLAN harvest scheduling analyses. These were applied for the first 50 years, and then a zero percent price trend was assumed for the remaining 100 years of the harvest scheduling planning horizon. These imply that nominal stumpage prices (i.e. those which include the effects of inflation) will increase during the next 50 years at a rate of 1 percent greater than the rate of inflation, and equal to rate of inflation from there on after.

Since price trends are reflections of expected futures, making such projections involves inherent uncertainty. In recognition of this uncertainty, a sensitivety analysis was performed by rerunning RUN-3 of the benchmarks using alternative stumpage price trends of 0, 2 and 3 percent. The results of these runs are quite complex and are discussed in detail in the Forest Planning files. Generally, higher price trends make silvicultural investments economically more attractive, but they also tend to result in the substitution of lower valued species for higher valued species in sale offerings during the early decades since it pays to hold the higher valued timber on the stump as far as maximizing PNV is concerned.

Based on Washington Office direction, a zero percent real price trend for all other resources was used during the development of the benchmarks and the alternatives. In other words, their future nominal values will change at rates equal to inflation.

3. Real Cost Trends

Based on Washington Office direction and Regional Planning direction, zero percent real cost trends were used for all future costs used in the development of the benchmarks and alternatives. In other words, the costs of labor, fuels, materials and all other factors of production involved with managing the forest are assumed to change at a rate equal to the rate of inflation.

4. Real Dollar Adjustments

Future prices and costs can be expressed in both nominal and real terms. The projection of nominal values includes the effects of inflation on these values. The projection of real values does not. For example, assume that the future prices for commodity XYZ are projected to increase annually by 5 percent. Also assume that the rate of inflation is anticipated to be 4 percent. In real terms, the prices are increasing by only 1 percent per year above and beyond the rate of inflation. Real value changes are the result of the interactions of supply and demand forces in the market place. They do not include the effects of inflation.

All future values and costs used in the Forest Planning process were expressed in real 1982 dollars, consistent with the 1985 RPA program. The GNP implicit price deflator index was used to convert both historical and future nominal prices and costs to this common base (FSM 1971.32b).

C. Costs Used for Economic Efficiency Analyses

This section describes the costs used to perform economic efficiency analysis for each of the benchmarks and alternatives considered during the development of the DEIS.

All Forest Service costs were included for purposes of estimating budgets and calculating present net values for each alternative. These costs were identified by their Management Information Handbook (MIH) codes as described in FSH 1309.11a. The MIH activity descriptions and their associated codes were useful for identifying how different costs would be treated during the planning process. Most costs, except capital investment road costs, were analyzed in FORPLAN. Costs were determined by examining: (1) the PAMARS data base, (2) ADVENT RPA budget planning files, and (3) historical records and contracts. Forest experience was also an important factor when it came to making assumptions regarding what bearing historical costs had on anticipated future costs. Costs were developed and reviewed by the Program Analysis Officer, Budget and Finance Officer, and the appropriate staff and sub-staff personnel. A more detailed presentation of the specific costs and their functions in the analytical tools can be found in the process records at the Supervisor's Office.

1. Costs Considered to be Fixed Across Alternatives

A cost was classified as "fixed" if it: (1) was not expected to vary significantly over the range of alternatives considered, (2) could not be tied to specific activities within any of the prescriptions, (3) represented a very small and insignificant amount of the forest budget, (4) had insufficient cost records to support assumptions about when or how much it would vary as different prescriptions were implemented, or (5) was not related to the production of outputs and effects which were relevant to addressing the Forest Planning ICO's. Fixed costs were a component of the budget estimates for each alternative.

2. Costs Considered to be Variable Across Alternatives

Other costs were classified as "variable." These costs were tied to the implementation of activities within a management prescription, and were expressed as costs per acre or costs per unit of output (i.e. dollars per MCF, dollars per RVD, etc.).

In general, FORPLAN contained all of the variable costs associated with implementing multiple use vegetative management activities including fuels treatment, logging, road construction/reconstruction and post harvest silvicultural costs. These costs were varied by slope class, stand volume, working group, visual sensitivity and roaded/unroaded condition. The FORPLAN model used by the Okanogan was not capable of modeling tree diameter. The effect of diameter was inferred by tree size at commercial entry times and culmination, and was unique to timber yield table. Sale administration and timber sale preparation costs were varied only by volume offered for sale. Non-federal costs were included in FORPLAN's PNV calculations, but did not influence the Forest Service budget estimates. Detailed information on timber management related costs are on file in the Forest Supervisor's Office.

All costs for recreation, except recreation and trail capital investments, were calculated and used in FORPLAN. Capital investment costs were calculated outside the FORPLAN model. A detailed discussion of recreation costs can be found in the Forest Planning document titled "Recreation Values and Costs." A summary of the procedures used for identifying recreation costs is as follows:

Average visitor day costs were calculated for developed, dispersed and wilderness recreation opportunities using the average cost in the ADVENT data base, and the average annual use from the 1979-1983 RIM Use Reports.

For dispersed recreation, it was assumed that 70 percent of the average visitor day cost is for unroaded recreation opportunities and 30 percent of the average visitor day cost is for roaded recreation opportunities. For roaded recreation opportunities, it was assumed that 90 percent of the cost occurs in a roaded natural setting and 10 percent in a rural setting.

Costs were determined for various type recreation opportunities based on analysis area type and the management emphasis applied. This resulted in 19 different recreation cost categories.

Similar costs for similar type recreation opportunities were combined, resulting in 18 different recreation cost categories.

Due to model constraints on the number of tables allowed, costs were further combined, resulting in the following wilderness and recreation cost categories by analysis area type and management emphasis.

Analysis Area Type	Management Emphasis	Cost
Wilderness	All	$2.26
Developed	Recreation	$1.26
	Wildlife	$1.13
	Timber	$ .79
All	Minimum Level	$ .01
Roaded or Unroaded (Regeneration Need)	Timber	$ .02
	Wildlife	$ .02
	Roaded Recreation	$ .18
Unroaded	Timber	$ .25
	Wildlife	$ .36
	Roaded Recreation	$ .38
Unroaded (Visually Significant)	Unroaded Recreation	$ .47
Unroaded (Nonvisually Significant)	Unroaded Recreation	$ .31
Unsuitable	Timber	$ .13
	Wildlife	$ .18
	Unroaded Recreation	$ .39

D. Benefits Considered for Economic Efficiency Analyses

This section describes both the priced and non-priced benefits which were incorporated in the economic efficiency analyses for each benchmark and alternative considered during the development of the DEIS.

Resource outputs to which dollar values were assigned constitute the priced benefits included in the present net value calculations. Like all of the costs included in the analyses, only those benefits incurred during the 50 year RPA planning horizon were incorporated in the PNV calculations. The economic efficiency analysis for each alternative also considered non-priced benefits. These are outputs for which no market transaction evidence is available and no reasonable basis is present for estimating a dollar value commensurate with the market values associated with the priced outputs. In these cases, a subjective qualitative value must be attributed to their production. Conceptually, the addition of the non-priced benefits to PNV is used to derive the net public benefits associated with each alternative. Both priced and non-priced outputs and their associated values will be summarized below. More detailed documentation of the specific values and the process used to develop them can be found at the Supervisor's Office.

1. Priced Benefits Considered for Economic Efficiency Analysis

Priced benefits fall into one of two categories: market and nonmarket (assigned). The market values constitute the unit price of an output normally exchanged in a market after at least one stage of production, and are expressed in terms of what people are willing to pay as evidenced by market transactions. Nonmarket values constitute the unit price of a nonmarket output not normally exchanged in a market at any stage before consumption, and thus must be imputed from other economic information (FSM 1970.5). They are valued in terms of what reasonable people would be willing to pay (above participation costs) rather than go without the output. Specifically, in relation to "willingness to pay," these values represent the marginal market clearing price for that resource (refer to 1985 RPA Market and Nonmarket Value Procedures). In either case, their values are theoretically commensurate and appropriate for inclusion in PNV calculations. The resources for which dollar values were estimated on the Okanogan consisted of recreation, wilderness, timber, range and special uses.

Timber, forage and developed recreation were the resources to which market prices were assigned in FORPLAN. These values were expressed in terms of dollars per thousand cubic feet paid at time of harvest. The stumpage prices were developed for both existing natural and future managed stands, and were working group and yield table specific.

The process for calculating the stumpage values was quite complex. All calculations were performed in terms of constant 1982 dollars. Also, since most of the source data was expressed in terms of dollars per thousand board feet, it was necessary to convert these to dollars per thousand cubic feet at different steps in the process. The stumpage values were first calculated for each individual species, and then converted to working group stumpage prices based on the species composition of each working group modeled in FORPLAN. The diameter specific values and costs were developed based on diameter class relative indices for lumber selling values, logging and manufacturing costs. Detailed information on derivation of stumpage price is on file in the Forest Supervisor's office.

After converting these species stumpage prices to working group stumpage prices, the next step was to enter them into FORPLAN. One final adjustment needed to be made. The logging costs used to derive the stumpage values pertained to historic logging practices. Future logging systems will employ more use of cable systems and less use of helicopter systems on moderate and steep terrain.

The range outputs represent the amounts of forage permitted to be grazed and is measured in units of animal unit months (AUMs). AUM values were calculated as the value of the marginal product of an AUM in the production of a marketable animal. The Forest Service entered into a cooperative agreement with the USDA Economic

Research Service to develop livestock enterprise budgets for each National Forest. The Range Budget Approach was used for this analysis. Because forest AUMs are not actually priced in a free competitive market, the calculated price is an estimate of market value. First, returns from all ranch products were determined. Then, all costs of production were subtracted. The remaining returns plus the cost of the Forest Service permits became the residual value of the AUM. This residual value of an AUM to ranch livestock production is comparable to consumer surplus timber values. Based on the information provided in the RPA 1985 Program Analysis for the DEIS, and the 2340 Regional Office memo of September 30, 1983, the AUM value for the Okanogan National Forest in 1982 dollars is $13.19.

A detailed discussion of recreation values can be found in the Forest Planning document titled "Recreation Values and Costs." A summary of the procedures used for calculating recreation values follows.

Recreation values for various recreation opportunity classes and various types of wildlife related activities were listed from the Region 6 Direction Packet. These values were based on the 1985 RPA Program Analysis.

Average annual wildlife user days were calculated for big game, non-game and fishing, and whether the use occurred in wilderness or in a roaded natural, rural or unroaded recreation opportunity setting.

Wilderness values were calculated based on the weighted average wildlife values plus the average between wilderness standard and less than standard values.

Developed recreation values were calculated based on the management emphasis of the surrounding area. Values varied between the recreation, wildlife and timber management emphasis because of the expected recreation opportunity class.

Roaded recreation values were calculated based on the visual significance of the analysis area and whether or not the analysis area had wildlife characteristics. Weighted average wildlife values plus the value for the expected recreation opportunity class as determined by the management emphasis for the area were used.

Unroaded recreation values were calculated based on the visual significance of the analysis areas. Weighted average wildlife values plus the value for the expected recreation opportunity class as determined by the management emphasis for the area were used.

Recreation values on unsuitable analysis areas were calculated based on the management emphasis for the area. Average values were used from the above steps.

Because several calculated values were the same, values were combined, resulting in 23 separate wilderness and recreation values.

Due to model constraints on the number of tables allowed, values were further combined, resulting in the following 15 wilderness and recreation value categories by analysis area type and management emphasis.

Analysis Area Type	Management Emphasis	Value
Wilderness	Wilderness	$14.52
Developed 1/	Recreation	$ 7.18
	Wildlife	$ 6.48
	Timber	$ 4.49
All	Minimum Level	$ 6.01
Roaded or Unroaded (Regeneration Need)	Timber	
	Wildlife	$11.28
	Roaded Recreation	$10.98
Unroaded	Timber	$ 7.54
	Wildlife	$10.76
	Roaded Recreation	$11.47
Unroaded (Visually Significant)	Unroaded Recreation	$14.18
Unroaded (Nonvisually Significant)	Unroaded Recreation	$ 9.14
Unsuitable	Timber	$ 7.16
	Wildlife	$10.29
	Unroaded Recreation	$11.65

2. Non-Priced Outputs Considered in Economic Efficiency Analysis

The calculation of PNV enables the comparison of alternatives with regards to their output levels for priced resources, and their efficiency in producing them. However, other factors also influence the decision-making process. In some cases, the importance of non-priced benefits for which it is impossible to assign monetary values can outweigh the advantages of producing higher levels of priced outputs. The importance of the need to consider these subjectively valued benefits in forest management decision-making is addressed in the NFMA Regulations which charge the Forest Service with identifying the alternative which comes nearest to maximizing net public benefits (36 CFR 219.12[F]).

1/ In the case of developed recreation the management emphasis refers to that of the surrounding area, rather than the emphasis applied to the developed site itself.

Net public benefits (NPB) represent the overall value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs), whether they can be quantitatively valued or not (36 CFR 219.3). Net public benefits include both priced and non-priced resource outputs, less all costs associated with managing the area. As stated earlier, all priced outputs and all costs associated with managing the forest are included in the caluclation of PNV. To this, the net subjective values of the non-priced outputs must be added in order to arrive at the overall NPB of an alternative. Some of the most important non-priced benefits addressed during the Okanogan National Forest planning process revolve around maintaining and enhancing the following:

a. Lifestyles
b. Diversity and Quality of Recreation Opportunities
c. Suitable Habitat for Threatened and Endangered Species
d. Ecosystem Diversity
e. Visual Quality
f. Historical and Cultural Resources
g. Water Quality
h. Air Quality

These are all outputs and effects which are influenced to a large degree by decisions regarding how to manage the forest. They are all the topic of one or more issues and concerns which were identified at the outset of the planning process. They are important, but it is not possible to measure their importance in dollar terms which are comparable to market values. Their values must be subjectively determined.

The provision for many of the non-priced benefits is achieved by applying constraints to the production of priced outputs (e.g. timber harvesting constraints in FORPLAN). These constraints usually result in a decrease in the PNV of the priced outputs to which the constraints were applied. Subjective judgments are then necessary in assessing whether the benefits of producing the non-priced outputs exceed the opportunity costs associated with producing fewer priced outputs. If a PNV tradeoff induced by the provision of a non-priced output is judged acceptable, then a positive contribution to NPB has resulted, and the alternative is overall more efficient.

The non-priced outputs considered during the development and evaluation of alternatives are discussed below. While the quantitative dollar values of each can not be determined, they can generally be evaluated by examining such quantitative indicators as acres of appropriate allocations, resource inventories, or timber production related activities and outputs.

a. Lifestyles

Important to maintaining and enhancing the North Central Washington lifestyle is the provision of diverse recreation opportunities, clean air and water. The freedom and ability to cut personal use firewood is also important. To the extent that an alternative results in reduced or less diverse recreation opportunities, lower quality water, smokier air, or more restrictive access to personal use firewood, the alternative will be less desirable from a lifestyle point of view. Many of these effects are directly related to land allocations and resource management goals which emphasize the production of wood at the expense of amenity values.

The stability of jobs and income in the area is also an element of the concern about lifestyles. For this purpose, each alternative was analyzed with regards to its potential impacts on jobs and income in Okanogan County (refer to Chapter IV of the DEIS). Any indications that the implementation of an alternative would result in fewer jobs and less income would be considered disruptive of the current lifestyles.

b. Diversity and Quality of Recreation Opportunities

The number of recreation visitor days (RVDs) and their associated priced values are included in the PNV calculations for each alternative. However, the assigned dollar values per RVD do not reflect the value of providing a diversity of recreation opportunities and settings. The forest currently provides adequate recreation diversity as indicated by the reasons many people choose to live and recreate in the area. However, some aspects of the recreation opportunity spectrum are becoming more difficult to retain. For example, as remaining roadless areas are either designated as wilderness, or roaded and developed for other uses, there are fewer opportunities for semi-primitive recreation opportunities. Related to this is the idea that as more and more roadless areas are either developed or designated as wilderness, future generations will have fewer options regarding how to best manage them to meet changing needs. To the extent that retaining roadless areas in undeveloped conditions does not overly restrict the efficient production of priced outputs, both the recreation diversity and the future options which they offer are considered a non-priced benefit. For each alternative, the recreation allocations and projected carrying capacities are categorized according to the recreation opportunity spectrum. This will be used to assess the recreation diversity that an alternative provides.

c. Suitable Habitat for Threatened and Endangered Species

Each alternative, except current direction, provides for at least enough habitat to satisfy the minimum management requirements (MMRs) and/or other protection of these species. However, some alternatives provide habitat for these species in excess of the MMRs/protection minimums. Any provision of suitable habitat in excess of these minimums is considered to be a non-priced benefit.

d. Ecosystem Diversity

Maintaining plant and animal ecosystem diversity over time is also considered as a non-priced component of net public benefits. Benefits generally associated with ecosystem diversity are gene pool maintenance, scientific research opportunities, and the reduction of insect and disease risks. Since animal diversity is to a large extent dependent upon plant diversity, attention is focused particularly on the number of acres for each working group in each successional stage. The amount of old growth provided is especially important since this component would be the most difficult to replace once it disappears. It serves as the focus for evaluating each alternative's impact on ecosystem diversity. Timber harvesting and fire are the chief means of manipulating vegetative diversity. The effects of scheduled timber harvesting on vegetative diversity were evaluated using FORPLAN inventory reports. To a certain extent, the more old growth provided for in a particular alternative, the higher the benefits associated with this non-priced output.

e. Visual Quality

The value of visual quality is indirectly represented through the consideration of recreation as a priced benefit. It is safe to assume that the provision of positive visual experiences has a direct relationship to the quantity and quality of recreation on the forest. However, a large number of people who benefit from the visually appealing scenery are not tallied as recreation users of the forest. For example, people who live in or around the forest every day enjoy scenic qualities associated with the forested mountain environment. These beneficiaries are not tallied as RVDs. These benefits are nonmeasurable.

The alternatives each vary in their emphases to satisfy visual quality objectives. This can be measured in terms of the percentage of the National Forest that is in a natural appearing condition.

f. Historical and Cultural Resources

A number of cultural resources are identified on the forest. Cultural resources are an issue in the sense that many people are concerned about how many and how adequately these cultural sites are being preserved and protected in the face of ground disturbing projects and vandalism that occurs on the forest. The more areas that are opened up to development for road construction, timber harvesting and minerals development, the more difficult it will be to protect these resources.

g. Water Quality

The water quality in lakes and streams is high. High water quality contributes largely to the outdoor enjoyment for recreationists. In general, sedimentation of streams and lakes is not a serious problem. However, activities in localized areas may cause temporary stream sedimentation.

h. Air Quality

Air quality is another important aspect of the North Central Washington area. For the most part, air quality conditions are good except during certain times in the winter when temperature inversions create woodstove pollution problems, and certain times during the spring and summer when prescribed burning activities are going on.

Air quality degradation resulting from fuels treatment and prescribed burning activities is, in general, directly related to the amount of scheduled timber and vegetative management activities associated with an alternative. The more acres of these activities called for in an alternative, the lower the quality of the air during certain seasons of the year.

V. SOCIAL AND ECONOMIC IMPACT ANALYSIS

A. Overview

1. Influence Zone

The social effects of Forest Service programs extend beyond the boundary of the National Forest. The zone of influence is the area which the forest directly affects. It is the smallest identifiable area where Okanogan National Forest goods, services and uses can be consumed year-round as basic necessities for recreational, spiritual or economic sustenance. This boundary was located by:

-- Initial interviews with Forest Service personnel knowledgeable of the area.
-- Review of the public comments to determine what the public conceptualizes as the local area.
-- Review of the preliminary management concerns to determine the area most closely tied to the forest.
-- Review of past Unit Plans and other studies related to the forest.
-- Interaction with the ID Team to integrate this area with the requirements of the NFMA.
-- Determining the area with identifiable political boundaries for which socio-economic data is available.

Based on these criteria, the area within Okanogan County was selected as the Zone of Influence. The town of Republic was also added because of its reliance on timber from the Okanogan National Forest.

An underlying assumption is that the forest has the greatest relative significance to, and effect upon, people who conceptualize the Okanogan National Forest as "home territory." Users from outside the county are considered to be more mobile and have the flexibility to alter their patterns of use to other forests or other areas within the forest. At this local level the effects of forest planning are the most significant and also the most meaningful to try to assess.

Detailed demographic and socio-economic characteristics are included for this area, centering on the Methow Valley, the Okanogan Valley and Tribal lands. Data for the rest of the county is included as it was available (e.g. the "north half"). Additional subjective information on the lifestyles and values of many of the groups of people are also included. Many of these people have distinct lifestyles and values because they are tied directly to the resources of the forest. Others in the county may be less directly dependent upon forest resources, but are affected by changes in uses. These may include businessmen and local professional people.

The lifestyles, "ways of life," "quality of life," "community identity," the future outlook of all of these people are affected by the type and level of forest activities. These more subjective characteristics are more difficult to assess. They may also be the most important factors as they are affected by demographic and socio-economic changes facilitated by changes in forest practices. These effects may not be what people want, as reflected by the public issues, but what may happen to them. These underlying values and lifestyles sometimes, but not always, reflect why people relate to and describe National Forest activities, not what the public wants or expects of certain things of the National Forest.

2. Social Factors

a. Population

Okanogan County is sparsely populated, with the population concentrated in the cities in the Okanogan Valley. Growth in the county was from rural to urban areas from 1950 to 1970. The trend was back to rural areas from 1970 to 1980 with a significant population growth of 21 percent. Towns have been growing again since 1970. Gradual population growth has occurred in the Okanogan and Methow Valleys. The Nespelem Valley had large population losses prior to 1970, but will stabilize. A natural increase, not in-migration, will account for almost all future growth in the county. School population will stabilize, while the family formation group will grow to 1990 and then decline. Limited growth for those under 19 years and over 65 years will occur, while the middle-aged group will remain stable to 1990 and then grow.

b. Political Institutions

Okanogan County and municipal governments have relatively small staffs with low public profiles and are not equipped to deal with large changes in the future. State and Federal agencies in the county have higher profiles, larger staffs and are more regulatory. Environmental concerns will continue to have noticeable influence and be the focus of public controversy. Tribal government will expand and be an important future source of growing power, while the USDI Bureau of Indian Affairs will be less important.

c. Family Institutions

Family size in Okanogan County is falling, but will stay above the State average. One parent families will continue to increase as will younger and older couples without families. Young couples will continue to postpone and have smaller families, but families will continue to form earlier than average in the county, with only a gradual, barely discernable shift away from traditional families. After gradual growth, the senior citizen population will stabilize after the year 2000.

Significant splits have occurred between mean and median family incomes (coupled with high unemployment and poverty), especially in the northern Okanogan Valley and the Methow Valley. This implies higher polarization among groups in these areas. These trends are projected to gradually decline, but high feelings of "relative deprivation" (have versus have nots) should continue to the year 2000 (at lower levels), with noticeable reductions thereafter as older residents are replaced.

d. Religious Institutions

Religious norms and values are generally quite conservative in Okanogan County (fundamentalistic and evangelical) and likely to continue. The trend will be a gradual but significant growth of locally-born young people with somewhat less traditional (to some, less moral) religious values (which will still be relatively conservative compared to urban areas). This means higher levels of conflicts in values among groups is probable.

e. Educational Institutions

School populations in Okanogan County will generally continue to decline from State averages, except for the city of Okanogan, which has grown and will continue to grow. This town has also been facing high levels of substandard rooms. Private school enrollments have declined even faster, especially grade school levels. Most standard indices of "quality education" are misleading, so the results are inconclusive. Education levels in the county have been lower, especially in Pateros, Brewster and Oroville. Although no correlation exists between education levels and professional occupational levels, some correlation can be drawn between professionals and concentrations of State and Federal Government (Okanogan City and Nespelem). All of Okanogan County has high blue collar employment, especially Methow, Nespelem and Tonasket.

f. Land Use

About 20 percent of Okanogan County is under Public or Tribal control. The Okanogan National Forest administers about 45 percent of the county. Over 85 percent of the county is in the Methow and Okanogan Valleys. Over 80 percent of the Methow is in the Okanogan National Forest and another 10 percent is State, with only 1.6 percent in private cropland. Forest use dominates the county, especially the Methow, most of which is Okanogan National Forest. Subdivision has increased rapidly, especially in the Methow. Building rates have slowed, but when they begin again, water and sewage will become increasingly significant problems. As trends continue, very high levels of land use conflict will continue in the Methow. Unregulated development is very disruptive, though most municipalities have some land use regulation. County rural areas have limited controls, except for the Methow where use is more restrictive with varying densities, open space and design criteria, reflecting varying attributes of the valley.

g. Senior Citizens

Between 1970 and 1980, the population of Okanogan County grew 20.6 percent, while the population of those over 65 years of age grew by 33.8 percent. Growth will continue, but with absolute numbers. Six senior citizen groups now provide transportation, housing referrals and nutritional meals and will continue to be active in the future.

h. Lifestyles and Values

Length of residence in Okanogan County is a primary determinant of group reference with many conflicts between groups, especially in the Methow Valley and particularly over forest uses. Group identification with the rest of the county is less well defined. Future Okanogan National Forest-Colville Confederated Tribes conflicts will gradually decline with continued positive communication, but conflicts will continue between Indian versus non-Indian values in the county.

Sharp land management conflicts and polarization are present between entrepreneurs and resource-based groups and further conflicts and polarization exist within resource-based groups over preservation versus conservation. Forest uses are particularly important to the Methow, especially to resource-based groups. Resource-based groups are most threatened, disrupted, often most powerless, and often most displaced by future non-resource-based growth, especially in the Methow. Most Methow residents believe some form of development and displacement will occur, even without Forest Service change in management. Most of the conflict in the Methow centers around the level of development. Entrepreneurs in the Methow appear well organized and financed. Newer arrivals tending towards preservation are not well financed, but are prepared to fight to save the rural way of life. Resource-based older residents of the Methow often feel powerless and threatened, and are often not well organized.

i. Minorities and Civil Rights

Native Americans represent the largest minority group in Okanogan County. Unemployment has been significantly higher for minorities, especially Native Americans and Hispanics. Native Americans are disproportionally represented in blue collar/service occupations. Seasonal employment in orchards and the woods is especially important to minorities. Native American culture belies fundamental differences in philosophy towards the land - its ownership and management. This, among other factors, has lead to hostility, anger and prejudice between Indians and non-Indians. The roots of these conflicts are historical and clerical. Minority data indicate the jobs women and minorities have traditionally held, but say little about the occupational potential of these workers.

3. Economic Factors

a. Overview

Wage earners dominate employment and total personal income in Okanogan County, with many working at relatively low individual income levels. Individual proprietors, especially farms, also dominate income totals. Agriculture is economically important, but employs small numbers of people with only a few in the upper income bracket. Agricultural employment has grown very slowly. Non-farm employment and incomes are dominated by services, Government, trade and manufacturing - primarily forest products (descending order). Total employment in the county will increase with a gradual reduction in unemployment. Employment in agriculture will continue to decline, small proprietors will stabilize around 1990 and forest products employment will continue declining while trades, Government and services are projected to more than offset declines.

b. Agricultural Economy

Irrigated acres in bottomlands contain all the prime and unique farmland and make the most contribution to the agricultural economy in Okanogan County. The apple industry is the most important agricultural enterprise. The number and size of farms will continue declining, with most being family owned and not making much money. A few large operations will dominate and get larger. Agriculture is economically important, but provides limited and seasonally fluctuating employment. Authorized Okanogan National Forest grazing has remained fairly constant with the amount determined by the condition of the range resource. Demand for range grazing is determined at the regional and national levels and is primarily tied to demand for red meat. So the demand for cattle and consequent grazing on the Okanogan National Forest cannot be disaggregated to the county, specifically the Okanogan National Forest.

c. Government Economy

Okanogan National Forest timber receipts disbursed to Okanogan County for roads and schools has fluctuated widely from 1981 to 1984. Temporary Okanogan National Forest employment fluctuates widely with the seasons, while permanent employment remains fairly stable. White males traditionally dominate Forest Service employment. The forest is striving to improve this, but it is difficult to find qualified minority/female professionals with the appropriate training and experience.

d. Timber Economy

About 48 percent of Okanogan County supports "commercial forest" land, with the Okanogan National Forest accounting for about half. The Colville Confederated Tribal lands account for about 20 percent of "commercial forest" land. Forests in the county are generally low to moderate in productivity. Many stands are poorly stocked, or diseased. Forest industry contributes a total of 80 to 85 million dollars to the county economy annually; second only to agriculture. Over 86 percent of county-grown logs are also used in the county. About 98 percent of Okanogan National Forest logs are used in a ten-county area.

Harvest levels, and to a lesser degree timber sold, are sensitive to economic conditions determining demand for forest products (e.g. housing). This is especially true for Okanogan National Forest timber; buyers can readily defer cutting Okanogan National Forest timber when the economy slows. The amount of timber offered for sale reflects timberland productivity, not demand for forest products. Demand for Okanogan National Forest timber may increase markedly in the future, especially because yields available to the forest products industry from remaining lands are decreasing. The Colville Confederated Tribes may divert its timber to its own mill operations in the future. Projected harvests vary, depending on the method of projection: increase by 10 percent by 1990, increase up to 27 percent by 2000 and decrease by 2 percent by 2000. Historically, there has been high correlation between forest industry employment and the amount of timber harvested, but no correlation between timber sold and employment in the forest products industry. Varying by projection method, forest industry employment may decline to about 1150 workers by the year 2000, slightly below current levels. Another method projects a decline to 725 to 790 (approximately) employees for industry employment by the year 2000. Wages are difficult to project because they depend on many factors not identifiable. In other timber futures, firewood, farm forestry and wood for use by industry as an energy source will be more in demand.

e. Recreation Economy

Recreation is especially important in the Methow Valley, with many developed Okanogan National Forest facilities. Only 8 percent of recreationists in a seven-county area (including Okanogan) leave the area. Federal recreation facilities account for an estimated two-thirds of all recreational use by area residents. Non-physical and inexpensive activities predominate, with camping and driving for pleasure the most significant recreational activities on the Okanogan National Forest. The Okanogan National Forest functions as a user-oriented, intermediate recreational resource, and only partially as a resource-based area. All recreational activities will increase, especially inexpensive and low physical activities, so conflicts with other forest uses will increase.

f. Support Economy

Roads -- Okanogan is a large county which has an extensive road system with a significant maintenance expenditure. Okanogan National Forest timber sale receipts help pay for the county road system.

Housing -- Although information is limited, general indications show that housing quality is low and estimate that 70 percent of total county housing is substandard.

Law Enforcement -- The large county area presents a problem for policing. A co-op agreement between the Forest Service and the Sheriff's Department for law enforcement on the Okanogan National Forest has been in force for about 6 months per year. Enforcement in the Methow Valley is especially difficult because of remoteness and high peak visitor usage.

Health and Social Services -- Okanogan County has an above average number of residents on public assistance. Alcoholism is a problem in the county, but especially in the Colville Confederated Tribes. Older residents are especially hard hit psychologically by growth and change, and mental health agencies are of limited value due to low acceptance of the agency by older residents who rely on their extended families.

B. Sources of Data

Social and Economic Assessment of Okanogan County, Washington by James C. Hutchins, Okanogan National Forest, June 1981.

C. Information Generated

This section is intended to help answer the fundamental questions:

"Why do people live here?" and "How do people describe the National Forests?" Data from these questions provide the Interdisciplinary Team with:

- a social overview of communities and groups that will be affected by Forest Service actions
- a description and production of changes in the communities based on their traditional relationship to the National Forests

Some social changes are not influenced by the Forest Service. These data are important to forest planning because of their implications for future management of the National Forest.

The term socio-economic is used to identify the social, current cultural, political, economic and demographic aspects of the communities around the National Forest. The technical economic analysis required in the planning regulations, such as "economic efficiency analysis," "demand expressed as a price-quantity relationship" and "costs and benefits in real-dollar values," are excluded from socio-economic assessment. These are analyzed separately as part of technical economic analysis covered by FORPLAN. Included are the topics of employment patterns and trends, the economic structure of the communities and area, the fiscal relationship of the forest to local government and the role of the forest in the local and area economy, as well as the full array of non-economic social, cultural, political and demographic concerns.

It is important to note that the Assessment of Social Effects is different than the activities and purpose of Public Participation. Public Participation is concerned with determining what people want; the Estimation of Social Effects is the systematic attempt to determine what will happen.

Public Participation is aimed at getting a wide segment of the concerned public to express their preferences regarding the forest, and to inform them of management constraints and possibilities.

The Assessment of Social Effects requires both a compiling of a realistic picture of what is and would otherwise be, and a social science knowledge of what has already occurred elsewhere under similar conditions.

The basic building blocks of the Socio-Economic Assessment include:

Population Dynamics: all the variables involving the counting of people.

Social Institutions: composed of people who share a common characteristic or concern, who are organized to pursue a common interest in society. Institutions are not organized specifically as special interest or pressure groups. However, institutions sometimes feel compelled to function as pressure groups.

Land Tenure and Land Use: the ways in which changes in land ownership or management and land use on lands adjacent to the National Forest are regulated and affected.

Lifestyles and Values: various ways of life, community identities, social values and symbolic meanings attached to the forest resource. This category deals with the ways people live, their sense of community or belonging and those variables which pull people apart or bring them together. This information is not structured population and socio-economic information, but deals with identifying social categories with distinctive shared values, lifestyles and identities; their "sense of belonging."

Minority and Civil Rights: a special interest that the Forest Service is required by law or sense of duty to take into account.

Economic Factors: including general economic information, timber, recreation, agricultural, trade and services, mining, governmental and support economy information.

More detailed information on this subject can be found in A Social and Economic Assessment of Okanogan County, Washington (Hutchins, 1981).

VI. ANALYSIS PRIOR TO DEVELOPMENT OF ALTERNATIVES

A. Introduction

The primary analysis performed prior to the development of alternatives was the "Analysis of the Management Situation" (AMS). The AMS summarizes the supply potentials for renewable resources of the Okanogan National Forest. The section includes an explanation of:

-- the objectives of the benchmarks,
-- the assumptions and constraints used,
-- trade-offs associated with the constraints,
-- the decision space defined by the benchmarks and other assessments, and
-- the most important implications of each benchmark.

Two types of benchmarks are presented: Maximum supply benchmarks and benchmarks to define opportunity costs. Maximum supply benchmarks show the decision space available. The other benchmarks are designed to define opportunity costs of minimum management requirements and discretionary constraints that will be considered in one or more alternatives.

These are the supply benchmarks reported:

1. Current direction (as defined in plans)
2. Timber
3. Present net value (assigned)
4. Range forage
5. Roadless recreation
6. Roaded natural recreation
7. Wildlife habitat
8. Minimum level management

The benchmarks designed to define opportunity costs are those required by the Regional Planning Direction (November 1983) on pages 60 and 61.

B. Development of Minimum Management Requirements

As the process of developing benchmarks and alternatives was under way, National direction was developed to ensure that they complied with the mimimum requirements of applicable laws and regulations. Subsequently, the Pacific Northwest Region developed direction to ensure that the mimimum requirements were applied consistently across the Region. This direction was incorporated into a matrix and distributed under a memo dated February 9, 1983, Land and Resource Management Planning (1920). The letter and matrix are on file at the Regional Office, Pacific Northwest Region, Portland, Oregon, and at the Supervisor's Office, Okanogan National

Forest, Okanogan, Washington. Since the document is lengthy and not totally pertinent to resource management on the forest, only its more significant points are summarized in the following section.

Regional direction provided guidelines for minimum management requirements (MMRs) pertaining to the management of the following resources:

1. Timber
2. Fish and Wildlife
3. Soil and Water Resources and Land Productivity
4. Water Quality
5. Riparian Areas
6. Range
7. Miscellaneous

The Forest Interdisciplinary Team, in assessing the relevant resource management situations and planning issues, determined that for many of the resources addressed in the Regional MMR direction, the application of standards and guidelines combined with coordination could protect most of the resources without impacting outputs or the production of goods and services on the forest. Specifically, the MMRs for soil and land productivity, water quality and range could be met without developing special requirements or restrictions. While these are important resources on the forest, no serious or significant problems are associated with them. Refer to Chapter III of the DEIS for more detailed discussions of individual resources.

It was necessary to apply the Regional guidelines in order to provide for MMRs related to riparian, timber and wildlife resources. With regard to timber harvesting, the regulations require that harvest units do not exceed 40 acres in size, and that a logical harvest unit is left between cutting units. Regulations also require that leave units can not be harvested until previously harvested units are no longer `openings.' Units are no longer considered to be openings when they are adequately stocked with trees 4.5 feet tall. On the Okanogan National Forest it takes between 11 and 17 years to grow a tree from seed to 4.5 feet including regeneration lag. This period is strongly related to elevation and to species. Low and mid elevation stands of ponderosa pine, western larch and Douglas-fir attain 4.5 feet sooner than higher elevation stands of Douglas-fir or mid and high elevations stands of Engelmann spruce and subalpine fir.

Dispersion coefficients were calculated for each working group based upon assumed cutting practices, species composition and elevation. All of the lodgepole pine working group was assumed to be regenerated by clearcut. Mixed conifer working groups (productive wet and productive dry) were assumed to be regenerated by approximately equal proportions of clearcut (or seedtree) and shelterwood. Created opening dispersion constraints are not applied to shelterwoods until removal of the overwood. The following formula was used to calculate the dispersion coefficients used in FORPLAN. It was obtained from Appendix 1, Regional Guidelines for Incorporating Minimum Management Requirements in Benchmarks and Alternatives, February 9, 1983, on file in the Supervisor's Office in Okanogan.

$$D = 1/H \times P/C \times 100$$

where:

D = The Harvest Dispersion Factor
H = The number of harvest periods required to cut over the entire area.
P = The length of a FORPLAN period in years.
C = The number of years required to close an opening after clearcutting.

This formula assumes all harvesting is by clearcut. It was modified as follows to account for the acreage that would be harvested by shelterwood.

$$D = \frac{\dfrac{(1/H)}{C} + \dfrac{(1/H)}{C-10}}{2}$$

Regional Direction was followed to meet MMRs for wildlife habitat. Species on the Okanogan National Forest for which MMRs were developed are the northern spotted owl, barred owl, pileated woodpecker, marten and northern 3-toed woodpecker as indicators for mature and old growth conifers; primary cavity excavators (woodpeckers) for dead and defective trees; the mule deer for winter range on the northeast portion of the forest; and bald eagle and grizzly bear as threatened species (the peregrine falcon, an endangered species, is no longer listed for the Okanogan National Forest).

For mature and old growth indicators, the habitat requirements (type, condition, amount and dispersal) were mapped. Suitable habitat was utilized when available, otherwise capable habitat was incorporated. Once the mapping was complete, the total required acreage was calculated. This amount was then constrained in FORPLAN in all alternatives except A (Current Direction). Habitat requirements for spotted owls use a "dedicated" approach (no programmed harvesting) and requirements for other mature/old growth indicators use a "managed" approach (stands available for scheduled harvest if replacement habitat is present) over the 150-year planning horizon.

For woodpeckers, the number and size of live trees necessary to produce future, minimum snag levels and the resulting timber yield loss was estimated. Timber yield coefficients were adjusted to reflect this loss in all alternatives except A (Current Direction).

For mule deer, the minimum amount of snow intercept thermal cover was estimated. This amount was then constrained in FORPLAN in certain alternatives other than A (Current Direction).

For threatened species, no modeling constraints in FORPLAN or elsewhere were indicated as necessary to comply with Recovery Plans or the Endangered Species Act.

C. Decision Space

The decision space for the Okanogan National Forest is defined by the maximum supply benchmarks stated earlier. Six key variables are used to show the decision space available for the most controversial of the Okanogan resources. They are: timber offered for sale; forage consumed; roadless area; old growth habitat outside the wildernesses; winter cover for deer; and roaded natural recreation opportunities. The description of each benchmark will contain an additional number of key variables for comparisons, but these six capture the flavor of the decision space.

1. Timber

Of the eight benchmarks, the maximum first decade timber volume offered for sale is 97 MMBF/year (20.0 million cubic feet/year). This is approximately equal to estimated demand. By the year 2000, demand could be expected to exceed even this supply. The timber benchmark falls nine percent short of the 1980 RPA target.

TABLE B-6 - Timber Comparisons

Benchmark	1990 Allowable Sale Quantity (MMBF)	LTSYC (MMCF)	Suited Acres (thousands)
Current Direction	61	18.0	537.3
TIMBER	97	23.2	695.6
PNV (assigned)	83	21.3	600.8
Range	83	21.8	625.2
Roadless recreation	52	14.7	406.4
Roaded recreation	74	20.7	677.7
Wildlife habitat	62	19.1	542.5
Minimum level	0		0
Range	0 - 97	0 - 23.2	0 - 696
Median	68	19.9	571.6

As indicated by Table B-6, the timber decision space is, effectively, between 500,000 and 700,000 acres and the intensity of managing those acres. The resultant decision space is 52 million to 95 million board feet per year.

2. Range

Forage consumption by domestic animals (AUMs) is not a direct decision of this planning effort, but the ability to provide is a consequence of these decisions. The range in values is from zero if existing contracts are not renewed to 89,000 AUMs under intensive, multiple-use management.

The 1980 RPA targets can be met, but not while maximizing other resource values. Current consumption levels can be met.

3. Roadless Areas

In addition to 71,000 acres of essentially unroaded lands in the North Cascades Scenic Highway, the Okanogan National Forest has 14 roadless areas totaling 481,000 acres. The decision space varies from protecting 107,000 acres to 481,000 acres of roadless recreation opportunities during the next 15 years. Theoretically, all 481,000 acres could be developed, but economic considerations alone would leave almost 60,000 acres undeveloped during the RPA horizon (next 50 years).

TABLE B-7 - Roadless Areas

Benchmark	Year 2000 (Thousand Acres)	Year 2030 (Thousand Acres)
Current Direction	392	337
Timber	286	130
PNV	429	279
Range	366	230
ROADLESS RECREATION	481	481
Roaded recreation	427	316
Wildlife habitat	441	343
Minimum level	481	481
Range	286-481	130-481
Median	428	326

4. Old Growth Habitat

The decision space for mixed conifer old growth habitat is small: 21,000 acres. The combination of MMRs and classified areas (Wildernesses and Scenic Highway) put a 'floor' of 183,000 acres (16,000 outside classified areas). The current inventory is 204,000 acres (37,000 outside classified areas).

In about 50 years from now, five percent of the existing mature mixed conifer forest could be expected to become old growth habitat - if left alone - and a similar addition would be expected each decade thereafter. Also, old growth habitat can be created from young stands through silviculture, but the results would not be available for at least 180 years. Therefore, the best that can be expected in the RPA planning horizon is to protect what is present today, but over the long run more can be accomplished.

Table B-8 compares the benchmarks with respect to old growth habitat. Note that current direction would not provide adequate amounts of old growth to meet MMRs.

TABLE B-8 - Old Growth Habitat Comparison

Benchmark	Thousands of Acres Mixed Conifer Outside Wilderness Areas at End of First Planning Period
Current direction	33
Timber	44
PNV	36
Range	43
Roadless recreation	40
Roaded recreation	36
WILDLIFE HABITAT	49
Minimum level	49
Range	33-49
Median	41.5

5. Deer

The quality of deer winter range on the Okanogan National Forest, particularly on the Okanogan Highlands, is dependent on amounts of thermal and snow intercept thermal cover (abbreviated here as "winter cover" for deer). As is the case with old growth, the range of possible alternatives is small. At the end of the first planning period (the year 2000), the range is only 8 percent and optimal amounts cannot be reached even with minimum level management.

Table B-9 compares benchmarks with regard to winter cover at the years 2000 and 2030.

TABLE B-9 - Winter Cover for Deer

Benchmark	Year 2000	Year 2030
Current direction	16	11
Timber	10	9
PNV	14	10
Range	13	11
Roadless recreation	15	13
Roaded recreation	15	12
WILDLIFE HABITAT	18	18
Minimum level	18	22
Range	10-18	9-22
Median	15	11.5

6. Roaded Recreation and Visual Resource

The majority of the most visually significant areas on the Okanogan are in classified areas protected by legislation, including 626,200 in the Pasayten and Lake Chelan/Sawtooth Wildernesses and 88,000 acres in the North Cascades Scenic Highway.

Outside classified areas, 210,000 acres have an inventoried visual quality level of retention and 289,000 acres have an inventoried visual quality level of partial retention. Of these acres, 116,000 acres of retention and 155,000 acres of partial retention are suitable for timber management. The remaining acreage is unsuitable for timber management.

Table B-10 shows the acres of visual quality objectives for retention and partial retention that would be associated with each of the benchmarks.

TABLE B-10- Visual Quality Objectives of the Benchmarks

Benchmark	Retention	Partial Retention
Current direction	298	289
Timber	290	117
PNV	390	237
Range	290	117
Roadless Recreation	406	272
ROADED RECREATION	406	272
Wildlife habitat	323	117
Minimum level	406	272
Range	290-406	117-272
Median	398	260

D. Supply Benchmarks

1. Introduction

The objectives, assumptions and constraints of the supply benchmarks are listed below.

The constraints common to all supply benchmarks are:

a. Nondeclining flow (NDF) at or below long-term sustained yield (LTSY)
b. Rotations based on 95% of CMAI
c. Ending inventory constraint
d. Resource outputs other than those being maximized will be at maximum present net value (PNV) levels

In addition, all supply benchmarks except current direction meet minimum management requirements. On the Okanogan National Forest, these are represented by the following values:

a. 9,000 acres of spotted owl habitat (from specific sites)
b. 11,400 acres of barred owl habitat (from specific sites)
c. 15,600 acres of pileated woodpecker habitat (from specific areas)
d. 14,020 acres of marten habitat (from specific areas)
e. 6,300 acres of three-toed woodpecker habitat (from specific areas)
f. 12,000 acres of snow intercept/thermal cover in the Tonasket key deer winter range

g. Dispersion constraints for sub-areas of the forest which vary from 15% in riparian areas, where water quality is of concern and harvest units would be small, to 61% in the best sites and where half the regeneration harvests would be expected to be shelterwoods.

Working Group	Elevation	Dispersion %
I	High	29
II		33
III		16
I	Low	61
II		33
III		21
Riparian	All	15

Resource outputs other than those being maximized should be those provided at present net value maximizing levels. To accomplish this, two runs were necessary for the timber and range forage benchmarks; the other benchmarks had PNV as the objective function.

Run #1 - Objective function to maximize the benchmark resource (timber or range). No limit will be placed on demand except that which is already built into the yield tables.

Run #2 - Objective function to maximize PNV for 150 years with the constraints of achieving the output level for the benchmark resource for each of the 15 decades that is achieved in run #1.

The following table presents present net value, discounted costs and discounted benefits for each supply benchmark.

TABLE B-11 - PNV, Discounted Costs and Discounted Benefits for Supply Benchmarks

Benchmark	PNV	Discounted Costs	Discounted Benefits
		(million dollars)	
PNV	355.5	332.1	687.6
Roaded Rec	341.7	296.7	638.3
Roadless Rec	318.1	212.9	531.0
Wildlife	313.6	249.7	563.3
Timber	280.3	475.3	755.6
Range	240.1	376.1	616.2
Min Level	95.4	9.1	104.5

2. Current Direction Benchmark

The Current Direction Benchmark is the basis for the Current Direction Alternative. The benchmarks are based on non-declining flow of timber and Current Direction is a departure alternative. The non-declining flow requirement puts the benchmarks on equal footing for comparisons to each other. Also, by displaying both non-declining flow (benchmark) and declining flow (Alternative A) reviewers have more information.

The plans used to interpret current direction are:

a. The 1969 Okanogan National Forest Timber Management Plan
b. The 1969 Winthrop Ranger District Multiple-Use Plan
c. The 1969 Conconully Ranger District Multiple-Use Plan
d. The 1969 Twisp Ranger District Multiple-Use Plan
e. The 1979 Tonasket Planning Unit Land Management Plan
f. The 1979 Interim Pasayten Wilderness Management Plan
g. The 1978 Okanogan National Forest Off-Road Vehicle Plan
h. The 1975 Biological Unit Plan for the Methow Deer Herds
i. The 1969 Okanogan National Forest Land Ownership Adjustment Plan
j. The 1974 North Cascades Joint Recreation Plan
k. Current Range Allotment Management Plans (1960-1984)
l. The 1980 Five-year Interim Road Management Plan
m. The 1978 Visual Resource Management Plan
n. The 1984 Region 6 Regional Guide
o. The 1984 Early Winters Alpine Winter Sports Study FEIS
p. The 1970 Golden Horn Multiple-Use Survey Report
q. The 1970 Liberty Bell Multiple-Use Survey Report
r. The 1970 Harts Pass Multiple-Use Survey Report
s. The 1970 Sawtooth Multiple-Use Survey Report
t. The 1984 Appropriate Suppression Response Implementation Plan
u. The 1981 "Methods of Managing Competing Vegetation," EIS

Current resource uses are based on these plans but vary both from the amounts called for in individual plans and from amounts calculated when analyzed in an integrated manner. For example, the adjusted 1969 Timber Management Plan calls for about 85 million board feet per year; because of budget limitations current amount offered for sale is about 79 million board feet per year. The result of an integrated analysis shown below is 61 million board feet per year, though the Long-Term Sustained Yield is 89 million board feet per year. These discrepancies result from: 1) improvements in analysis techniques, and 2) each of the plans being formed individually instead of being integrated.

The other major resource use that falls short of its individual plan is the visual resource. Trade-offs have been made on a site-by-site basis through the NEPA process. One of the major benefits from this planning process is the integrated analysis of resources. The next few paragraphs disclose the basis for the integrated analysis of current direction.

a. Dimensions

In addition to the above plans, five considerations guided the development of the Current Direction Benchmark: (1) Selected NFMA requirements; (2) current plans; (3) budget; (4) non-declining flow; and (5) outputs and activities. Specifically, the considerations are:

(1) Only NFMA requirements that are a part of current direction as established in the above named plans are followed.

(2) Current plans fix the land allocation. An exception is where adjustments can be made to reflect updated, improved information on the suitability of land for timber production.

(3) The total forest budget is constrained to current levels. The current level is defined as the average Okanogan National Forest budget adjusted to 1982 dollars.

(4) Non-declining flow is followed for the entire 150-year planning horizon.

(5) Output and activity levels projected by existing plans are met as closely as possible for all time periods given that the four preceding assumptions are met. Any interresource trade-offs made to meet current projected levels are based upon direction from current plans, recent activities and outputs and the budget.

The current land use acres are:

	ACRES
Timber	160,300
Wildlife	144,300
Scenic Highway	87,600
Roaded Recreation	518,100
Unroaded Recreation	92,600
Wilderness	626,200
Developed Recreation	2,500
Range	13,800
Minimum Management	124,800

These acres were represented in FORPLAN by the following FORPLAN prescriptions:

Suited for Timber Management	ACRES
Minimum Management	168,908
Timber	59,987
Wildlife	197,066
Retention	90,658
Partial Retention	134,855
Semi-primitive Recreation	27,400
Scenic Highway	23,495
Range	0
Not Suited for Timber Management	
Wilderness	626,220
Other	376,557

b. Estimated Outputs and Effects

The following outputs and effects (displayed for five decades) are those related to Forest Planning Issues and Concerns; significant supply/demand problems; and significant Resource Planning Act targets.

TABLE B-12 Current Direction Benchmark Outputs and Effects

Output, Effect, or Cost (unit of measure)	1990	2000	2010	2020	2030
RECREATION					
Developed Recreation Use (Thousand RVDs)	622	876	925	980	1042
Non-Wilderness Dispersed Recreation Use (Thousand RVDs)	469	569	636	710	794

Visual Quality Objectives (Thousand Acres)					
Retention	[--------------------140--------------------]				
Partial Retention	[--------------------162--------------------]				
Unroaded Dispersed Recreation Opportunities (Acres)	432	392	372	359	337
WILDLIFE AND FISH					
Old Growth Habitat					
Total	187	187	187	187	177
Outside Wilderness (Thousands of acres, mixed conifer)	33	33	33	33	23
Deer (Snow intercept/thermal cover as a %)	17	16	12	13	11
Primary Cavity Excavators (% of Maximum Potential Woodpecker Populations)					
Total	60	60	60	60	60
Outside Wilderness	50	50	50	50	50
RANGE					
Permitted Grazing (Thousands Animal Unit Months/Year)	62	68	64	62	61
TIMBER					
Allowable Sale Quantity (Million Cubic feet/year)	13.2 (61 million board feet)	13.2	13.2	13.2	13.2
Long-Term Sustained Yield Capacity (Millions of Cubic Feet)	18.0 (not reached in 150 years)				
Lands Suited for Timber Production (Thousands of Acres)	[-----------------537.3-------------------]				
Lands Not Suited for Timber Production (Thousands of Acres)	[----------------1168.9--------------------]				
WATER					
Sediment Yield (Thousands Tons/year index)	636	442	450	407	389

3. Timber Benchmark (with MMRs)

a. Dimensions

Objective function of run #1 - Maximize Timber for first decade
Objective function of run #2 - Maximize Present Net Value

Other Constraints - None

b. Estimated Outputs and Effects

TABLE B-13 Timber Benchmark (with MMRs) Outputs and Effects

Output, Effect, or Cost (unit of measure)	1990	2000	2010	2020	2030
RECREATION					
Developed Recreation Use (Thousand RVDs)	605	853	902	954	1012
Non-Wilderness Dispersed Recreation Use (Thousand RVDs)	391	475	531	593	663
Visual Quality Objectives (Thousand Acres)					
Retention	113	98	84	68	52
Partial Retention	122	99	81	70	44
Unroaded Dispersed Recreation Opportunities (Thousand Acres)	361	286	237	179	130
WILDLIFE AND FISH					
Old Growth Habitat					
Total	199	199	189	188	187
Outside Wilderness (Thousands of acres, mixed conifer)	44	44	34	33	32
Deer (Snow intercept/thermal cover as a %)	14	10	10	12	9

Primary Cavity Excavators (% of maximum potential woodpecker populations)					
Total	59	57	56	55	54
Outside Wilderness	47	44	42	40	39
RANGE					
Permitted Grazing (Thousand Animal Unit Months/Year)	61.4	65.5	62.3	65.2	65.8
WATER					
Sediment yield (Tons/year index)	454	415	411	403	431
TIMBER					
Allowable Sale Quantity (Million Cubic feet/year)	20.0	20.0	20.0	20.0	20.1
Long-Term Sustained Yield Capacity (Millions of Cubic feet)	[--------------------23.5--------------------]				
Lands Suited for Timber Production (Thousands of Acres)	695.582				
Lands Not Suited for Timber Production (Thousands of Acres)	1010.618				
First Decade Timber Offered (MBF/YR)	97				

c. FORPLAN Prescriptions

Suited for Timber Management	ACRES
Minimum Management	22,587
Timber	321,942
Wildlife	156,557
Retention	44,276
Partial Retention	110,628
Semi-primitive Recreation	1,168
Scenic Area	0
Range	45,221
Not Suited for Timber Management	
Wilderness	626,220
Other	377,557

4. Present Net Value Benchmark

a. Dimensions

Objective function - Maximize present net value

Other Constraints - None

b. Estimated Outputs and Effects

TABLE B-14 Present Net Value Benchmark Outputs and Effects

Output, Effect, or Cost (unit of measure)	1990	2000	2010	2020	2030
RECREATION					
Developed Recreation Use (Thousand RVDs)	622	876	925	980	1042
Non-Wilderness Dispersed Recreation Use (Thousand RVDs)	465	565	631	705	789
Visual Quality Objectives (Thousand Acres)					
Retention	126	117	106	97	90
Partial Retention	154	144	134	129	123
Unroaded Dispersed Recreation Opportunities (Thousand Acres)	456	429	383	322	279
WILDLIFE AND FISH					
Old Growth Habitat					
Total	197	191	191	190	189
Outside Wilderness (Thousands of acres, mixed conifer)	42	36	36	35	34
Deer (Snow intercept/ thermal cover as a %)	16	14	11	12	10
Primary Cavity Excavators (% of maximum potential woodpecker populations)					
Total	62	62	62	63	63
Outside Wilderness	51	51	51	53	53

RANGE					
Permitted Grazing (Thousand Animal Unit Months/Year)	72	79	73	71	71
WATER					
Sediment Yield (Tons/year index)	472	381	389	335	415
TIMBER					
Allowable Sale Quantity (Million Cubic feet/year)	16	16	16	16	16
Long-Term Sustained Yield Capacity (Millions of Cubic feet)	[------------------21.25-------------------]				
Lands Suited for Timber Production (Thousands of Acres)	600,785				
Lands Not Suited for Timber Production (Thousands of Acres)	1,105,415				
First Decade Timber Offered (MBF/YR)	82.7				

c. FORPLAN Prescriptions

Suited for Timber Management	ACRES
Minimum Management	71,230
Timber	118,107
Wildlife	307,770
Retention	58,217
Partial Retention	102,496
Semi-primitive Recreation	30,408
Scenic Area	0
Range	14,142
Not Suited for Timber Management	
Wilderness	626,220
Other	377,557

5. Range Forage Benchmark

a. Dimensions

Objective function of run #1 - Maximize forage consumption for 15 decades.
Objective function of run #2 - Maximize present net value.

Other Constraints - None

b. Estimated Outputs and Effects

TABLE B-15 Range Forage Benchmark Outputs and Effects

Output, Effect, or Cost (unit of measure)	1990	2000	2010	2020	2030
RECREATION					
Developed Recreation Use (Thousand RVDs)	605	853	902	954	1012
Non-Wilderness Dispersed Recreation Use (Thousand RVDs)	375	455	509	568	635
Visual Quality Objectives (Thousand Acres)					
Retention	130	126	109	93	74
Partial Retention	146	133	111	98	76
Unroaded Dispersed Recreation Opportunities (Thousand Acres)	421	374	337	292	229
WILDLIFE AND FISH					
Old Growth Habitat					
Total	199	198	197	196	194
Outside Wilderness	44	43	42	41	39
(Thousands of acres, mixed conifer)					
Deer (Snow intercept/thermal cover as a %)	14	13	11	12	11

Primary Cavity Excavators (% of maximum potential woodpecker populations)					
Total	60	59	58	57	56
Outside Wilderness	48	47	45	44	42
RANGE					
Permitted Grazing (Thousand Animal Unit Months/Year)	89	99	98	101	101
WATER					
Sediment Yield (Tons/year index)	464	374	374	375	376
TIMBER					
Allowable Sale Quantity (Million Cubic feet/year)	16.7	16.7	16.7	16.7	16.7
Long-Term Sustained Yield Capacity (Millions of Cubic feet)	[--------------------21.8--------------------]				
Lands Suited for Timber Production (Thousands of Acres)	625,194				
Lands Not Suited for Timber Production (Thousands of Acres)	1,081,006				
First Decade Timber Offered (Million BF/Yr)	83				

c. FORPLAN Prescriptions

Suited for Timber Management	ACRES
Minimum Management	16,100
Timber	108,083
Wildlife	23,905
Retention	27,863
Partial Retention	4,120
Semi-primitive Recreation	0
Scenic Area	0
Range	522,299
Not Suited for Timber Management	
Wilderness	626,220
Other	377,557

6. Roadless Recreation Benchmark

a. Dimensions

Objective function - Maximize present net value

Other Constraints:

- Constrain all roadless areas to roadless recreation

- Constrain all roaded areas to roaded recreation or minimum level

- Constrain harvest openings to the following dispersion amounts:

Working Group	Dispersion %
I	11
II	9
III	10
Riparian	11

- Meet inventoried VQ levels in all decades

b. Estimated Outputs and Effects

TABLE B-16 Roadless Recreation Benchmark Outputs and Effects

Output, Effect, or Cost (unit of measure)	1990	2000	2010	2020	2030
RECREATION					
Developed Recreation Use (Thousand RVDs)	622	876	925	980	1042
Non-Wilderness Dispersed Recreation Use (Thousand RVDs)	468	569	636	709	794
Visual Quality Objectives (Thousand Acres)					
Retention			140		
Partial Retention			167		
Unroaded Dispersed Recreation Opportunities (Thousand Acres)	481	481	481	481	481

WILDLIFE AND FISH					
Old Growth Habitat					
Total	199	195	195	195	195
Outside Wilderness (Thousands of acres, mixed conifer)	44	40	40	40	40
Deer (Snow intercept/ thermal cover as a %)	17	15	13	14	13
Primary Cavity Excavators (% of maximum potential woodpecker populations)					
Total	60	60	60	60	60
Outside Wilderness	50	49	49	48	48
RANGE					
Permitted Grazing (Thousand Animal Unit Months/Year)	63	67	55	53	51
WATER					
Sediment Yield (Tons/year index)	548	376	383	378	385
TIMBER					
Allowable Sale Quantity (Million Cubic feet/year)	[------------------10.0-------------------]				
Long-Term Sustained Yield Capacity (Millions of Cubic feet)	[------------------14.7-------------------]				
Lands Suited for Timber Production (Thousands of Acres)	406,425				
Lands Not Suited for Timber Production (Thousands of Acres)	1,299,775				
First Decade Timber Offered (MBF/YR)	52.2				

c. FORPLAN Prescriptions

Suited for Timber Management	ACRES
Minimum Management	71,586
Timber	91,361
Wildlife	117,891
Retention	73,337
Partial Retention	113,950
Semi-primitive Recreation	200,917
Scenic Area	23,495
Range	9,831
Not Suited for Timber Management	
Wilderness	626,220
Other	377,557

7. Roaded Recreation Benchmark

a. Dimensions

Objective function - Maximize present net value

Other Constraints:

- Constrain all areas with the potential for roaded recreation to choosing from roaded recreation strategies or minimum level.

- Constrain all areas of inventoried retention visual quality level to provide retention visual quality in all 15 periods.

- Constrain all areas of inventoried partial retention visual quality level to provide partial retention in all 15 periods.

- Constrain harvest openings to the following dispersion amounts:

Working Group	Elevation	Dispersion %
I	High	8%
II		9%
III		8%
I	Low	11%
II		9%
III		10%
Riparian	All	11%

b. Estimated Outputs and Effects

TABLE B-17 Roaded Recreation Benchmark Outputs and Effects

Output, Effect, or Cost (unit of measure)	1990	2000	2010	2020	2030
RECREATION					
Developed Recreation Use (Thousand RVDs)	622	876	925	980	1042
Non-Wilderness Dispersed Recreation Use (Thousand RVDs)	470	571	638	712	797
Visual Quality Objectives (Thousand Acres)					
Retention	[--------------------140--------------------]				
Partial Retention	[--------------------168--------------------]				

Unroaded Dispersed Recreation Opportunities (Thousand Acres)	457	427	379	361	316
WILDLIFE AND FISH					
Old Growth Habitat					
Total	197	191	191	191	190
Outside Wilderness (Thousands of acres, mixed conifer)	42	36	36	36	35
Deer (Snow intercept/ thermal cover as a %)	17	15	12	13	12
Primary Cavity Excavators (% of maximum potential woodpecker populations)					
Total	60	60	60	59	59
Outside Wilderness	49	49	48	47	47
RANGE					
Permitted Grazing (Thousand Animal Unit Months/Year)	60	65	58	57	57
WATER					
Sediment Yield (Tons/year index)	551	380	389	383	393
TIMBER					
Allowable Sale Quantity (Million Cubic feet/year)	[-------------------14.1-------------------]				
Long-Term Sustained Yield Capacity (Millions of Cubic feet)	[-------------------20.7-------------------]				
Lands Suited for Timber Production (Thousands of Acres)	677,658				
Lands Not Suited for Timber Production (Thousands of Acres)	1,028,542				
First Decade Timber Offered (MBF/YR)	74				

c. FORPLAN Prescriptions

Suited for Timber Management	Acres
Minimum Management	75,993
Timber	108,629
Wildlife	201,696
Retention	111,976
Partial Retention	157,575
Semi-primitive Recreation	0
Scenic Area	23,495
Not Suited for Timber Management	
Wilderness	626,220
Other	377,557

8. Wildlife Habitat Benchmark

a. Dimensions

Objective function - Maximize present net value for 15 decades

Other constraints:

- All areas outside wilderness, developed sites and the North Cascades Scenic Highway are restricted to wildlife prescriptions.

- The wildernesses are constrained to wilderness emphasis; developed sites to current uses but not use levels; and the scenic highway to a non-scheduled timber harvest prescription.

- Dispersion constraints are based on defining openings as having vegetation less than six feet in average height.

Working Group	Elevation	Dispersion %
I	High	20%
II		25%
III		13%
I	Low	40%
II		25%
III		18%
Riparian	All	7.5%

b. Estimated Outputs and Effects

TABLE B-18 Wildlife Habitat Benchmark Outputs and Effects

Output, Effect, or Cost (unit of measure)	1990	2000	2010	2020	2030
RECREATION					
Developed Recreation Use (Thousand RVDs)	605	853	902	954	1012
Non-Wilderness Dispersed Recreation Use (Thousand RVDs)	448	544	608	679	759
Visual Quality Objectives (Thousand Acres)					
Retention	128	117	105	91	87
Partial Retention	152	135	121	104	90

Unroaded Dispersed Recreation Opportunities (Thousand Acres)	454	441	393	381	343
WILDLIFE AND FISH					
Old Growth Habitat					
Total	204	204	204	204	203
Outside Wilderness	49	49	49	49	48
(Thousands of acres, mixed conifer)					
Deer (Snow intercept/ thermal cover as a %)	18	18	18	18	18
Primary Cavity Excavators (% of maximum potential woodpecker populations)					
Total	62	63	64	64	64
Outside Wilderness	51	53	54	55	57
RANGE					
Permitted Grazing (Thousand Animal Unit Months/Year)	73	78	71	72	70
WATER					
Sediment Yield (Tons/year index)	633	375	382	378	385
TIMBER					
Allowable Sale Quantity (Million Cubic feet/year)	[------------------11.8-------------------]				
Long-Term Sustained Yield Capacity (Millions of Cubic feet)	[------------------19.1-------------------]				
Lands Suited for Timber Production (Thousands of Acres)	542.5				
Lands Not Suited for Timber Production (Thousands of Acres)	1163.7				
First Decade Timber Offered (MBF/YR)	62				

c. FORPLAN Prescriptions

Suited for Timber Management	Acres
Minimum Management	132,493
Timber	0
Wildlife	542,443
Retention	0
Partial Retention	0
Semi-primitive Recreation	3,938
Scenic Area	23,495
Range	0
Not Suited for Timber Management	
Wilderness	626,220
Other	377,557

9. Minimum Level Management Benchmark

a. Dimensions

All areas constrained to the minimum management prescription.

b. Estimated Outputs and Effects

TABLE B-19 Minimum Level Management Benchmark Outputs and Effects

<table>
<tr><th>Output, Effect, or Cost (unit of measure)</th><th>1990</th><th>2000</th><th>2010</th><th>2020</th><th>2030</th></tr>
<tr><td>RECREATION</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Developed Recreation Use (Thousand RVDs)</td><td colspan="5">[----------------------0--------------------]</td></tr>
<tr><td>Non-Wilderness Dispersed Recreation Use (Thousand RVDs)</td><td>395</td><td>478</td><td>535</td><td>597</td><td>669</td></tr>
<tr><td>Visual Quality Objectives (Thousand Acres)</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Retention</td><td colspan="5">[-------------------406--------------------]</td></tr>
<tr><td>Partial Retention</td><td colspan="5">[-------------------272--------------------]</td></tr>
<tr><td>Unroaded Dispersed Recreation Opportunities (Thousand Acres)</td><td colspan="5">[-------------------481--------------------]</td></tr>
<tr><td>WILDLIFE AND FISH</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Old Growth Habitat</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td colspan="5">[-------------------204--------------------]</td></tr>
<tr><td>Outside Wilderness (Thousands of acres, mixed conifer)</td><td colspan="5">[---------------------49--------------------]</td></tr>
<tr><td>Deer (Snow intercept/ thermal cover as a %)</td><td>18</td><td>18</td><td>18</td><td>22</td><td>22</td></tr>
<tr><td>Primary Cavity Excavators (% of maximum potential woodpecker populations)</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>62</td><td>63</td><td>64</td><td>65</td><td>67</td></tr>
<tr><td>Outside Wilderness</td><td>51</td><td>53</td><td>54</td><td>57</td><td>60</td></tr>
</table>

RANGE					
Permitted Grazing (Thousand Animal Unit Months)	49	0	0	0	0
WATER					
Sediment Yield (Tons/year index)	365	365	365	365	365
TIMBER					
Allowable Sale Quantity (Million Cubic feet/year)	[----------------------0----------------------]				

c. FORPLAN Prescriptions

Minimum Management - all acres

E. Opportunity Costs

Four trade-off analyses of existing policies are required. These trade-offs are called "opportunity costs." The existing policies are:

- Minimum management requirements (MMRs)
- Rotations restricted to 95% or longer of CMAI
- Non-declining flow
- Non-declining flow and CMAI

The three opportunity costs examined are:

- Present Net Value (PNV)
- Long-Term Sustained Yield (LTSY)
- First Decade Harvest Volume (1 DECADE)

Eleven runs were made so they could be compared to show the opportunity costs. Those runs are summarized below:

TABLE B-20 - Summary of Benchmark Runs

RUN 1/	ECON TBLS 2/	MMR's 3/	DPRT 4/	NDY 5/	UTIL STNDS 6/	95% CMAI 6/
1	-			x		x
2	A		x		x	
3	A			x		x
4	A	x	x		x	
5	A	x	x			x
6	A	x		x	x	
7	A	x		x		x
8	M	x	x		x	
9	M	x	x			x
10	M	x		x	x	
11	M	x		x		x

1/ Except for BM #1, all have objectives of maximizing PNV and all have ending inventory constraints.

2/ A = Assigned values; M = "Market" values only

3/ Old growth and dispersion

4/ Departure floor of 80% of current; upper and lower = 25% variation

5/ NDY = Non-declining flow

6/ Rotation base

Results of the eleven benchmarks are listed below:

TABLE B-21 PNV, LTSY and First Decade Harvest for 11 Benchmarks

Benchmark Number	PNV for 15 Decades (million $)	LTSYC (MMCF)	1st Decade Harvest (million cubic feet)
2	392.663	199	333
3	373.654	227	179
4	336.677	187	268
5	363.618	194	252
6	358.706	199	166
7	355.481	213	159
8	169.454	171	276
9	164.435	191	274
10	161.979	179	178
11	156.167	203	167

1. MMRs

Minimum management requirements (MMRs) are compared in two cases: with and without non-declining flow as a constraint. The calculations show significant falldowns due to MMRs, especially in first decade volumes.

	Allowing departure		Non-declining flow	
PNV	7%	($26 million)	5%	($18 million)
LTSYC (decade)	6%	(11 mmcf)	6%	(15 mmcf)
1st decade	19%	(64 mmcf)	11%	(20 mmcf)

2. 95% CMAI

The opportunity costs of restricting rotations to at least 95% of culmination of mean annual increment (mature) are calculated for four different conditions: with and without non-declining flow and with and without assigned values in the economic calculations of PNV.

As the table shows, LTSY would be decreased if rotations were shorter than maturity (95% of CMAI). Present Net Value would be slightly enhanced by harvesting before maturity, and first decade volumes would be increased somewhat except with departure.

	Departure with assigned	NDY with assigned	Depart with market only	NDY with market only
PNV	1% ($3 million)	1% ($3 million)	3% ($5 million)	4% ($6 million)
LTSY	+3%	+7%	+12%	+14%
1st dec	6% (16 mmcf)	5% (8 mmcf)	1% (2 mmcf)	6% (11mmcf)

3. Non-declining Flow (NDF)

The opportunity costs of constraining timber schedules to non-declining flow are calculated for four different conditions: with and without restrictions of rotation lengths to 95% of CMAI and with and without assigned values in the calculations of PNV.

As the table shows, LTSY would be decreased if departure schedules were allowed. Present Net Value would not be affected slightly, indicating that one of the common reasons for departing, to increase PNV, is weak on the Okanogan National Forest. First decade volume offered for sale, in contrast, would be substantially decreased by a non-declining flow policy.

	Utilization standards with Assigned	CMAI with Assigned	Utilization standards with Market	CMAI with Market
PNV	2% ($8 mil)	2% ($8 mil)	4% ($7 mil)	5% ($8 mil)
LTSY	+6%	+10%	+4%	+6%
1st dec	38% (102 mmcf)	37% (93 mmcf)	35% (98 mmcf)	39% (107 mmcf)

4. NDF and CMAI in Combination

The opportunity costs of non-declining flow (NDF) and restricting rotations to 95% of CMAI or longer are calculated for three different conditions: (1) without MMRs but with assigned values; (2) with MMRs and with assigned values; (3) with MMRs but with market values only.

The LTSY is increased in all three cases when rotations are restricted to maturity or longer and non-declining flow is scheduled. The PNV is decreased three percent for these constraints under standard operating assumptions (condition `2'). First decade harvest, though, is significantly reduced to meet these constraints; virtually all the falldown is due to NDF.

	Without MMRs With Assigned	With MMRs With Assigned	With MMRs Market only
PNV	5% ($19 million)	3% ($11 million)	8% ($13 million)
LTSY	+14%	+13%	+19%
1st dec	46% (154 mmcf)	41% (110 mmcf)	39% (109 mmcf)

VII. FORMULATION OF ALTERNATIVES

A. Overview

A proposed action in the Forest Plan is a mix of management prescriptions applied in specific amounts and locations of the forest to achieve a desired management goal and objectives. According to NFMA (36 CFR 219.12f) alternatives must:

- Be within the maximum and minimum resource potential of the forest to provide a full range of major commodity and environmental resource uses and values that could be produced from the forest.
- Be formulated to facilitate analysis of opportunity costs, resource use and environmental trade-offs among alternatives.
- Be formulated to facilitate evaluation of present net value, benefits and costs of achieving various outputs and non-priced benefits.
- Address and respond differently to major public issues, management concerns and resource opportunities.
- Represent the most cost-efficient combination of management prescriptions to meet the objectives of the alternative.
- State the condition and uses that will result from long-term implementation.
- State what goods and services will be produced, including timing and flow of outputs, and the costs and benefits generated.
- State the resource management standards and guidelines.
- State the purposes of the proposed management direction.

Formulation of alternatives, planning step five, followed the Analysis of the Management Situation. Benchmarks from this analysis defined the range within which alternatives were developed. In addition, five alternatives were required: one which responds to the RPA program targets, another which reflects current and future level of goods and services if current management was continued (the no-action alternative), one that emphasizes high market opportunities, one that emphasizes high nonmarket opportunities, and one that emphasizes undeveloped lands with intensified management on the remainder of the forest. The following is a listing of the planning actions involved in the process of analyzing and evaluating alternatives.

Step 1. Major public issues, management concerns and opportunities were identified through public and internal meetings and Forest Plan Reports (see Appendix A). What was an issue to some people was viewed as an opportunity by others and may have been a concern to the forest. Unroaded lands is an example. They are an issue because of the question of how to manage them, yet they present opportunities to use them for undeveloped recreation or for timber harvest. They are a concern to the Forest Service because we need to establish some stable and long-term management direction for these areas.

Step 2. A comprehensive multi-resource data base was formed based on the identified issues and concerns and stored in a computer data base system.

Step 3. Analysis areas which represent similar physical and biological attributes were identified and mapped. The capability, suitability and management opportunities of specific areas of the forest were considered in this step.

Step 4. A set of management prescriptions were prepared to represent a variety of possible ways and intensities to manage the forest.

Step 5. The analysis areas identified in Step 3 were assigned management prescriptions. Some analysis areas were assigned only one prescription while others were assigned a variety of prescriptions that could be applied. Single prescription assignments limit the model's choices to apply or not apply the prescription.

Step 6. Resource outputs and the associated costs and dollar values that would result when a prescription was implemented were calculated and entered into the computer model FORPLAN.

Step 7. Demand was estimated for those resources which were identified as issues.

Step 8. During the Analysis of the Management Situation, supply potentials were determined using the FORPLAN computer model and other techniques. Various assumptions, constraints and objectives were used to establish benchmarks for supply potentials of each resource. A benchmark was established for maximum present net value. Existing resource supply and projected demand was compared. Opportunities to resolve issues and management concerns were explored by comparing existing and projected demand to potential production levels. These potentials, when compared to the Current Direction, indicate opportunities and/or need for change. This step concluded the analysis of the management situation.

Step 9. Alternative goals were established to provide a broad range of options for future management of the forest. Descriptions were written to define the resource management intent for each alternative. Objectives were represented in FORPLAN in the form of model constraints.

Further information on the FORPLAN model is presented in Chapter III of this Appendix.

Alternative goals and objectives were identified using expected use and demand for resources within the supply potential (upper and lower limits), and public issues.

The Interdisciplinary Team incorporated cost efficiency into the planning process. First cost efficient prescriptions were developed. Second, the Interdisciplinary Team developed different alternatives and identified the necessary constraints to address specific objectives, issues and concerns. Prescription assignments, combined with the necessary constraints, were analyzed in FORPLAN to identify an optimal solution which maximized PNV and achieves specific resource objectives in the most economically efficient manner. With varying objectives each alternative produces a different combination of priced and non-priced outputs. Each alternative is analyzed using the FORPLAN model where all resource objectives (constraints) must be satisfied before an optimal solution is identified.

During the Analysis of the Management Situation, resource supply potentials were determined by establishing minimum and maximum production levels called benchmarks (see Chapter VI of this Appendix). The benchmark analysis was done using the FORPLAN model where production capabilities were determined for single resources as well as for a set of multiple resource outputs that maximize present net value. This analysis established the benchmark levels required by National planning direction. Those benchmarks serve as a reference from which the costs and effects of various objectives and constraints used in developing alternatives were evaluated.

Selected benchmarks were used to define upper and lower limits for the production of each resource. The Interdisciplinary Team considered supply potential and minimum levels of output (upper and lower limits), and evaluated public input to establish the range of resource output levels within which alternative resource objectives were assigned.

The FORPLAN model was used to estimate the outputs and costs for each alternative by reflecting the objective of the alternative through a given set of constraints. Constraints applied to each alternative are discussed in detail in this section.

B. Common Constraints

Some constraints and prescriptions were commmon or constant in all the alternatives. These were necessary to meet some planning requirements, to meet existing law or policy, or to meet the objectives of prescriptions. The first two constraints discussed below were constant. Following those are a discussion of constraints that were common, but the amount of area they applied to varied by alternative.

1. Constraint: Control the amount of inventory volume left at the end of the planning horizon.

   Purpose: Assure that the total inventory volume left at the end of the planning horizon will equal or exceed the volume that would occur in a regulated forest.

   Rationale: The ending inventory constraint controls age class distribution through the planning horizon to assure the base harvest schedule concludes with a regulated volume in perpetuity.

   Tradeoff: PNV is reduced as controls on age class distribution are imposed.

2. Constraint: A dispersion constraint was used in all alternatives so that logical cutting units were left in between.

   Purpose: To comply with Sec. 219.27 of the NFMA regulations.

   Rationale: The model potentially could have harvested an entire Analysis Area in one decade without such a constraint.

   Tradeoff The Allowable Sale Quantity (ASQ) and PNV for the alternatives were slightly reduced as a result of this constraint.

3. Constraint: Harvest scheduling constraints were applied to prescriptions in every alternative to achieve the objectives for visual quality and wildlife habitat. The amount of area where the visual and wildlife prescriptions applied varied widely in the alternatives.

   Purpose: The model would have scheduled too much harvesting too fast and in too large of units to achieve the conditions that result in pleasing landscapes or proper wildlife habitat conditions.

Rationale: Visual Quality and wildlife habitat were key issues, so prescriptions and model constraints were developed to address these issues.

Tradeoff: ASQ and PNV were slightly reduced because of these constraints.

4. Constraint: Constraints were used to control the rate of departure in alternatives where departure was necessary to meet the goals and objectives of the alternative.

Purpose: To prevent erratic drops in the ASQ from one decade to the next.

Rationale: If the rate of departure is not controlled, very erratic patterns developed in some of the model runs. The ASQ would drop as much as 25% to 30% per decade for two decades and then increase 50% for a decade only to drop again by 25% or more in the next decade. This type of scheduling would not be responsive to the issue of local and regional lifestyles and economies. It would tend to result in an unstable local economy.

Tradeoff: PNV is reduced some to provide for stability in local and regional economies.

5. Constraint: Constraints were used to meet some of the wildlife minimum management requirements in all alternatives except A.

Purpose: To provide suitable habitat for species requiring old growth forests.

Rationale: The model scheduled stands to be harvested at 95% of culmination in some instances. Stands at that age (80 to 110 years) that were needed for wildlife purposes did not develop the proper habitat conditions. Stands managed to create old growth habitat do not develop proper characteristics until about age 180. A constraint specified the minimum acreage of old growth habitat needed. A second constraint was used for such stands so they could not be harvested until they reached age 180 or older. These constraints acting in concert delayed harvest sufficiently to provide old growth while preventing excessive delay in harvest.

Tradeoff: These constraints resulted in a decrease in the ASQ, LRSY and in PNV.

6. Constraint: There are areas on the forest for which prescriptions were developed but they were fixed as constants in the benchmarks and all of the alternatives. These were the wildernesses, North Cascade Scenic Highway, and established Research Natural Area.

Purpose: To perpetuate and protect the values and resources for which these areas were established.

Rationale: The management of these areas was well established and we did not have the authority to consider a wide range of choices or prescriptions.

Tradeoff: No specific tradeoff analysis was done to determine what the effects of establishing these areas was.

7. Constraint: Harvest scheduling constraints were used in all alternatives for lodgepole pine and low productive working groups.

Purpose: To reduce large between decade fluctuations of volume harvested between working groups.

Rationale: The model would have scheduled large fluctuations in harvest that could not be implemented because industry would not be capable of responding on a decade by decade basis to large changes in species and product size.

Tradeoff: PNV, LRSYC and ASQ were slightly reduced.

The items discussed above were common to all the alternatives. The variation in the alternatives occurred largely as a result of applying different management prescriptions to different areas of the forest.

C. Development of Alternatives

The following discussions focus on the development of each alternative. Numerous iterations occurred for each alternative where prescriptions or schedules were adjusted to better accomplish the goals and objectives of the alternative. The final sets of constraints and objectives for each alternative follow.

A detailed description of the alternatives can be found in Chapter II of the DEIS, Alternatives Considered in Detail. The acres described below are "suited" unless otherwise designated as "unsuited."

1. Alternative A (Current Direction)

This alternative is the **NO ACTION ALTERNATIVE** required by NEPA regulations. It represents a continuation of management direction as defined by the existing land use and functional resource plans identified in Chapter I of the DEIS. This alternative also meets the Pacific Northwest Region planning requirements to formulate a departure alternative.

The goal of Alternative A is to emphasize visual quality in visually sensitive areas of the Okanogan National Forest while providing a high level of timber outputs and recreation opportunity. Other resources are provided at levels which maximize present net value. Because this alternative portrays direction based on existing plans, the alternative does not contain the minimum management requirements (MMRs) spoken to in the regulations promulgated from the National Forest Management Act. It is the only alternative that does not incorporate MMRs.

The criteria and assumptions underlying the development of this alternative are:

a. Achieve the common alternative constraints discussed earlier.

b. Use a departure timber schedule.

c. Provide 7,650 acres of snow intercept thermal cover on deer winter range.

d. Harvest no more than 2.0 MMCF per decade of low productive timber.

e. Harvest no more than 4.3 MMCF per decade of lodgepole pine. Ceiling based upon planned offering of lodgepole pine in the 1969 Timber Management Plan.

f. Provide for at least 116,000 acres of Retention and 154,000 acres of Partial Retention on suited lands. Provide for 32,990 acres of Retention and 67,103 acres of Partial Retention on unsuited lands.

g. Provide for at least 26,752 acres of wildlife habitat emphasis on unsuited lands.

h. Retain 27,400 suited acres and 121,287 unsuited acres as Roadless.

i. No new Research Natural Areas are proposed.

j. Designate the 12,600 acres of Riparian areas to roaded recreation management emphasis.

2. Alternative B

The goal of Alternative B is to meet all resource targets assigned to the Okanogan National Forest by the 1980 Resources Planning Act program in the most cost effective manner. This alternative is required by Pacific Northwest Region planning direction (11/83).

The criteria and assumptions underlying the development of this alternative are:

a. Achieve the common alternative constraints discussed earlier.

b. Use a non-declining yield timber schedule.

c. Provide 34,000 acres of snow intercept thermal cover on deer winter range in decades one and two and 32,000 acres in decades three through fifteen.

d. Harvest no more than 4.0 MMCF per decade of low productive timber.

e. Harvest between 43,000 and 61,000 MMCF per decade of lodgepole pine in decades one and two. Harvest between 35,000 and 49,000 MMCF per decade in the remaining decades.

f. Provide for at least 21,088 acres of Retention and 29,191 acres of Partial Retention on suited lands. Provide for 7,816 acres of Retention and 15,870 acres of Partial Retention on unsuited lands.

g. Provide for at least 149,140 acres of wildlife habitat emphasis on suited lands and 65,400 acres on unsuited lands.

h. Provide for at least 17,900 acres of mixed conifer old growth.

i. Retain 22,184 suited acres and 145,881 unsuited acres as Roadless.

j. Two new Research Natural Areas are proposed for inclusion in the system. (Includes approximately 2,000 suitable acres.)

k. Designate the 12,600 acres of Riparian areas as Partial Retention.

3. Alternative C

The goal of Alternative C is to emphasize the production of non-market resources, including roaded and unroaded recreation, wildlife and fish, water, and areas of high scenic quality. Other resources would be managed at a level to maximize present net value. This alternative is required by current Pacific Northwest Region planning direction.

The criteria and assumptions underlying the development of this alternative are:

a. Achieve the common alternative constraints discussed earlier.

b. Use a non-declining yield timber schedule.

c. Provide 34,000 acres of snow intercept thermal cover on deer winter range.

d. Harvest no more than 2.0 MMCF per decade of low productive timber.

e. Harvest between 24 and 35 MMCF per decade of lodgepole pine in decades one and two; and between 18 and 30 MMCF per decade in the remaining decades.

f. Provide for at least 44,750 acres of Retention and 99,308 acres of Partial Retention on suited lands. Provide for 30,972 acres of Retention and 46,457 acres of Partial Retention on unsuited lands.

g. Provide for at least 58,043 acres of wildlife habitat emphasis on unsuited lands.

h. Provide for at least 29,900 acres of mixed conifer old growth.

i. Retain 124,494 suited acres and 241,085 unsuited acres as Roadless.

j. One new Research Natural Area is proposed for inclusion into the system. (Includes approximately 1,000 suitable acres.)

k. Designate the 12,600 acres of Riparian areas to wildlife management emphasis.

4. Alternative D

The goal of Alternative D is to emphasize those management practices and activities which increase revenues to the Federal Government. Revenue producing activities are primarily timber harvest, range use by domestic livestock, use of developed recreation sites where fees are charged, and issuance of special use permits for recreation activities such as at Loup Loup Ski Area and Early Winters. Other resources would be managed at a level that maximize present net value. This alternative is required by current Pacific Northwest Region planning direction.

The criteria and assumptions underlying the development of this alternative are:

a. Achieve the common alternative constraints discussed earlier.

b. Use a non-declining yield timber schedule.

c. Provide 8,340 acres of snow intercept thermal cover on deer winter range.

d. Harvest no more than 4.0 MMCF per decade of low productive timber.

e. Harvest between 43 and 61 MMCF per decade of lodgepole pine in the first two decades and between 35 and 49 MMCF per decade in the remaining decades.

f. Provide for at least 51,176 acres of Partial Retention on suited lands. Provide for 64,100 acres of Retention and 23,686 acres of Partial Retention on unsuited lands.

g. Provide for at least 16,100 acres of mixed conifer old growth.

h. No new Research Natural Areas are proposed.

5. Alternative E

The goal of Alternative E is to retain the current roadless areas to meet benefits for scenery, unroaded recreation, wildlife, and other non-market resources. Intensive timber management would be practiced on roaded lands in order to maintain a moderate level of harvest. The objective is to maximize the production of timber from roaded areas, while providing other resources at levels which maximize present net value. This alternative is required by Pacific Northwest Region planning direction.

The criteria and assumptions underlying the development of this alternative are:

a. Achieve the common alternative constraints discussed earlier.

b. Use a non-declining yield timber schedule.

c. Provide 8,340 acres of snow intercept thermal cover on deer winter range.

d. Harvest no more than 2.0 MMCF per decade of low productive timber.

e. Harvest between 12 and 24 MMCF per decade of lodgepole pine.

f. Provide for at least 16,100 acres of mixed conifer old growth.

g. All roadless areas will remain undeveloped and roadless.

h. No new Research Natural Areas are proposed.

i. Designate the 12,600 acres of Riparian areas to timber management emphasis.

6. Alternative F

The goal of Alternative F is to emphasize the production of timber at minimum costs, while providing optimal management of mule deer habitat in the Methow Valley. Other resources would be provided at levels which maximize present net value.

The criteria and assumptions underlying the development of this alternative are:

a. Achieve the common alternative constraints discussed earlier.

b. Use a non-declining yield timber schedule.

c. Provide 21,450 acres of snow intercept thermal cover on deer winter range for the first three decades and 24,400 acres for the remaining decades.

d. Harvest no more than 3.0 MMCF per decade of low productive timber.

e. Harvest between 30 to 50 MMCF per decade of lodgepole pine in decades one and two. In decades three through fifteen, harvest between 20 and 40 MMCF per decade.

f. Provide for at least 96,953 acres of wildlife habitat emphasis on suited lands and 54,547 acres on unsuited lands.

g. Provide for at least 17,900 acres of mixed conifer old growth.

h. Retain 69,397 suited acres and 216,539 unsuited acres as Roadless.

i. No new Research Natural Areas are proposed.

7. Alternative G

The goal of Alternative G is to produce quality wildlife habitat and high scenic values. Other resources would be managed at levels to maximize present net value.

The criteria and assumptions underlying the development of this alternative are:

a. Achieve the common alternative constraints discussed earlier.

b. Use a non-declining yield timber schedule.

c. Provide 33,000 acres of snow intercept thermal cover on deer winter range for decades one through three. Provide 36,000 acres for the remainder of the planning horizon.

d. Harvest no more than 4.0 MMCF per decade of low productive timber.

e. Harvest between 35.5 and 37.5 MMCF per decade of lodgepole pine in decades one and two; 25 and 50 MMCF per decade in decade three; and 25 and 45 MMCF per decade in decades four throught fifteen. Lodgepole pine harvest level in the first two decades was determined in early alternative runs. In those runs it was allowed to vary from 35 MMCF to 62 MMCF.

f. Provide for at least 53,036 acres of Retention and 33,217 acres of Partial Retention on suited lands. Provide for 45,884 acres of Retention and 22,370 acres of Partial Retention on unsuited lands.

g. Provide for at least 149,138 acres of wildlife habitat emphasis on suited lands and 65,400 acres on unsuited lands.

h. Provide for at least 17,900 acres of mixed conifer old growth.

i. Retain 45,766 suited acres and 160,719 unsuited acres as Roadless.

j. Two new Research Natural Areas are proposed for inclusion in the system. (Includes approximately 2,000 suitable acres.)

k. Designate the 12,600 acres of Riparian areas to wildlife habitat management emphasis.

8. Alternative G (Departure)

The goal, objectives and other features of this alternative are identical to Alternative G except that a moderate level of timber (80 MMBF per year, 16 MMCF per year) would be provided in the first decade. This alternative would depart from non-declining even-flow during the first decade (for the next 10 years the harvest level is raised above that which could be sustained at a constant or increasing amount). This would phase in a reduced harvest level to enable the local industry to adjust capacities. Approximately 17 MMBF (3.6 MMCF) of lodgepole pine would be included in the annual timber sale program in the next two decades in order to develop a market for that species, and to forestall losses to mountain pine beetle. This alternative meets Pacific Northwest Region planning direction to formulate a departure alternative.

The criteria and assumptions underlying the development of this alternative are the same as Alternative G, except a departure timber schedule was used to hold wood outputs near the current level given the reduction in suitable land base.

9. Alternative H

The goal of Alternative H is to produce moderate levels of timber while simultaneously providing large amounts of high quality wildlife habitat. The objective is to maximize timber outputs while managing other resources at levels which maximize present net value.

The criteria and assumptions underlying the development of this alternative are:

a. Achieve the common alternative constraints discussed earlier.

b. Use a non-declining yield timber schedule.

c. Provide 29,100 acres of snow intercept thermal cover on deer winter range for decades one through three. Provide 33,600 acres per decade for the remainder of the planning horizon.

d. Harvest no more than 4.0 MMCF per decade of low productive timber.

e. Harvest between 43 and 65 MMCF per decade of lodgepole pine in decades one and two. Harvest 30 to 50 MMCF per decade in the rest of the planning horizon.

f. Provide for at least 116,091 acres of wildlife habitat emphasis on suited lands and 222,758 acres on unsuited lands.

g. Provide for at least 23,000 acres of mixed conifer old growth.

h. Designate 64,105 unsuited acres as Roadless.

i. Two new Research Natural Areas are proposed for inclusion in the system. (Includes approximately 2,000 suitable acres.)

j. Designate the 12,600 acres of Riparian areas to wildlife habitat management emphasis.

10. Alternative I

This alternative was presented to the Okanogan National Forest by a coalition of individuals from various environmental organizations. The goals of this alternative are to retain most of the roadless areas so they could be considered for future classification as wilderness, to manage key wildlife habitat for wildlife benefit, and manage areas adjacent to major travel routes for their scenic qualities. The objective of the alternative is to manage other resources at levels to maximize present net value.

The criteria and assumptions underlying the development of this alternative are:

a. Achieve the common alternative constraints discussed earlier.

b. Use a non-declining yield timber schedule.

c. Provide 34,000 acres of snow intercept thermal cover on deer winter range.

d. Harvest no low productive timber.

e. Harvest between 10 and 20 MMCF per decade of lodgepole pine.

f. Provide for at least 46,434 acres of Retention on suited lands and 42,605 acres of Retention on unsuited lands.

g. Provide for 56,276 acres of wildlife habitat emphasis on unsuited lands.

h. Provide for at least 29,900 acres of mixed conifer old growth.

i. Retain all roadless suited acres and 277,676 unsuited acres as Roadless.

j. Two new Research Natural Areas are proposed for inclusion in the system. (Includes approximately 2,000 suitable acres.)

k. Designate the 12,600 acres of Riparian areas to wildlife habitat emphasis.

l. Allow no timber or range management emphases.

VIII. EFFECTS OF BENCHMARKS, CONSTRAINTS AND ALTERNATIVES

A. Introduction

This section provides a detailed discussion of the outputs and effects of the DEIS Alternatives. The focus is upon the tradeoffs between the alternatives as they provide different levels and mixes of goods and services, and as they address the planning ICO's in different ways. The purpose of presenting a discussion pertaining to the outputs and effects of each alternative, the consequences of the constraints used to help formulate them, and their relationship to the benchmarks, is to facilitate the identification of the alternative which comes closest to maximizing net public benefits. In order to accomplish this objective, an understanding is necessary of the abilities of the forest to produce different goods and services in response to the ICO's, and the tradeoffs involved with the decisions to produce one mix of outputs as opposed to another. As such, this comparative analysis provides the basis for selecting a proposed action, which is Step 8 of the planning process.

B. Process for Evaluating Significant Constraints

The multiple resource management objectives associated with a particular benchmark or land management alternative were represented in FORPLAN as a combination of constraints and an objective function. The objective function was usually "maximize present net value." This objective function guided the FORPLAN model in the selection of the most economically efficient combination of prescriptions, activity scheduling choices, and resource output levels which satisfied the multiple resource management objectives of a particular benchmark or alternative.

However, the maximization of present net value was subject to first satisfying all of the constraints which were used to represent the other resource management objectives not provided for by the economic efficiency objective function. The imposition of the constraints reduced the PNV for a particular alternative. The PNV given up in response to achieving the objectives of a constraint is referred to as the "opportunity cost." In order to isolate the opportunity cost associated with a particular constraint, or set of constraints, the resulting solutions of FORPLAN runs made with and without the constraints included in them were examined for their differences in PNV (and other outputs and effects of interest). As long as the only difference between the runs being compared was the addition of the constraints, the reduction in PNV represented the opportunity cost (at the margin) of achieving the constraint's objective.

During the Benchmark Analyses, constraint sets which were needed in order to achieve the various multiple resource management objectives were developed and evaluated. For example, all of the different constraints which were proposed in order to achieve the MMRs were evaluated both individually and collectively, to determine the magnitude of their tradeoffs, and to assess the relative efficiency of alternative constraint sets designed to achieve common objectives. If one set of constraints achieved a particular objective with less impact on the PNV than an alternative set of constraints designed to accomplish the same purpose, it was considered more efficient and was used throughout the remainder of the process of developing and analyzing alternatives. Sometimes, alternative approaches to formulating constraints to meet a common objective were not available. In these cases, the analysis was performed solely to determine the opportunity costs associated with the constraints.

Discretionary constraints (those not legally required) were also examined in order to assess the magnitude of their opportunity costs. These constraints were often used in conjunction with special prescriptions in order to produce the desired multiple resource management objectives (i.e. visual quality, wildlife habitat, recreation settings, etc.) of an alternative. The policy constraints associated with non-declining flow and rotations based on CMAI were also evaluated in the context of their effects on PNV, timber output levels, amount of old growth and roadless area. Finally, sensitivity analyses were performed in order to provide information regarding the consequences involved in making assumptions about timber management costs, and future stumpage values (i.e. price trends).

The results of these analyses are provided in the "Summary of the Analysis of the Management Situation" planning document, and in Chapter VI of this Appendix. The results are discussed in detail in these documents so they will not be repeated here.

The opportunity costs associated with the individual constraints in each alternative were not evaluated due to the prohibitive costs of performing this type of analysis. However, many of the constraints used to formulate the alternatives were examined in the benchmarks, so their approximate tradeoffs can be determined from that analysis. Also, each alternative was developed and analyzed with a sequence of three to seven FORPLAN runs in which the differences between the solutions were examined in order to determine the tradeoffs and effects associated with the collective group of constraints added from one run to the next. This analysis was usually performed to help develop and refine the constraints which were unique to each alternative as was discussed in Chapter VII of this Appendix. Finally, by comparing the alternatives in their final forms, the economic tradeoffs of their different collective multiple resource management objectives were assessed. These efficiency

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tradeoffs were then compared to the environmental and socioeconomic consequences in order to help identify the alternative, or alternatives, which came closest to maximizing net public benefits.

C. Analysis of Tradeoffs Among Alternatives

This section summarizes the relationships among the economic values discussed above, the community effects, and the differing responses among alternatives to selected Issues, Concerns and Opportunities (ICO's) discussed in Appendix A. The purpose is to highlight major economic and noneconomic tradeoffs or combinations of differences that can be quantified as indicators of response to ICO's among alternatives. However, a complete understanding of differences among alternatives requires reading all of this chapter and Chapter IV of the DEIS.

To provide a partial framework for assessing these tradeoffs, the long-term resource demands or needs of the nation, region and local communities are briefly summarized. Then selected economic values and quantified indicators of responsiveness to major ICO's are tabulated. Finally, differences and similarities among individual alternatives are summarized in terms of major tradeoffs among competing objectives or responses to expressed public issues, management concerns, or resource use and development opportunities.

1. National, Regional and Local Overview

National (RPA) planning estimates that total national demands will rise for all outputs of the National Forests. At the same time, demand to protect and enhance the quality of the environment is strong. Demands and prices for commodity production are generally determined in national markets and the nation benefits most when supplies are provided from the most efficient sources of production. In general, the Okanogan National Forest is an efficient supply source for timber. In contrast, on certain lands the economic benefits associated with the production of timber are less than the cost of production.

Demands for outdoor recreation uses are essentially local and regional. Recreationists on the Okanogan Forest come from thoughout the State of Washington with most users from the Seattle/Puget Sound area. Recreation use of the forest is expected to increase in the next two decades (Washington State Outdoor Recreation Plan for Districts 3 and 7). Beyond that, recreation demand is expected to increase not only as a function of population, but also as use on adjoining areas is displaced by other resource activities.

In Okanogan County, employment and income levels are dominated in descending order of importance by services, government, trade and forest products manufacturing. Unemployment rates have been high in Okanogan County; in 1984 the unemployment rate was 17.1 percent.

2. Economic Values and Responses to Major Issues, Concerns and Resource Use and Development Opportunities

The major reason that alternatives differ is that each responds to the issues, concerns and resource use and development opportunities (ICO's) identified for the Okanogan Forest in different ways. This section summarizes many of these differences in responses by defining indicators of those responses that can be quantified. It also discusses indicators of central concern to the nation as a whole, as owner of this forest. Appendix A presents linkages between the ICO's and individual indicators. Seven issues and national concerns with great influence on the alternatives and indicators of responsiveness include:

a) The level of timber harvest while responding to other demands. Indicators:

- -- volume of timber harvested
- -- long-term sustained yield
- -- suitable acres available for timber production

b) Areas to be managed as roadless areas while meeting other demands. Indicators:

- -- acres of roadless areas

c) Quality of habitats and wildlife and fish populations. Indicators:

- -- acres of mixed conifer old growth
- -- population of deer

d) Contribution of the forest to the economic development and way of life of nearby communities. Although no quantitative indicators reflecting ways of life are available, Table B-14 displays the implications of the alternatives. Indicators of contribution to economic development:

- -- number of forest-dependent jobs
- -- dollar income generated in dependent communities
- -- payments to counties

e) Resolution of conflicts between developed and dispersed recreation demands and other resource needs. Indicators:

- recreation visitor days for developed sites, roaded areas and unroaded areas
- acres of visual quality objective, Retention
- acres of visual quality objective, Partial Retention

f) Areas to be accessed for mineral development. Indicators:

- road access on high probability mineral areas

g) Rivers to be classified as wild and scenic. Indicators:

- Percent rivers inventoried as classification maintained

In addition, the nation as a whole has an interest in ensuring that the Okanogan National Forest is managed in a financially prudent manner while the quality of the physical environment is protected and enhanced. Indicators of national interest:

- net economic value, as measured by present net value
- net cash flow
- noncash economic benefits

In Table II-7 (see Chapter II of the DEIS), the indicators identified above are used to suggest the degree of response of each alternative to these ICO's. Other displays in Chapter II and discussions in Chapter IV of the DEIS provide more detailed information about specific effects and trade-offs.

3. Responses to Major ICO's or Groups of ICO's

Except for Alternative A, which was designed to portray the outputs and effects associated with continuing on with current management direction, the alternatives were specifically tailored to reflect different ways of addressing the planning issues, concerns and opportunities. The following discussion highlights some of the variation in the way the major issues were treated between them. Table II-1 of the DEIS tabularly summarizes these differences. For a more complete description of the ICO's and the role they played in the forest planning process, refer to Appendix A. Chapter II of the DEIS and the following portions of this Appendix present the detailed outputs and effects of the alternatives with regards to their responses to the issues and concerns.

Two common threads to the major ICOs are vegetation management and access. These two threads drove the formulation of alternatives.

The factors relating to the timber issues center around how much and what kind of timber will be sold on an annual basis. This was addressed in the alternatives in three ways: (a) by varying how much of the forest was available for timber production; (b) by exploring departure timber schedules in order to achieve higher wood outputs in early decades than could be produced under nondeclining flow; and (c) by vaying the objective function of preliminary runs, thereby varying economic considerations. The resulting wood outputs were expressed in terms of average annual millions of cubic feet, and average annual millions of board feet. These outputs were also estimated for three timber working groups: 1) mixed conifer (Moist and Dry), 2) lodgepole pine, and 3) separate suitability component (low productivity).

The factors relating to the wildlife issues center around habitat capability for certain key species such as mule deer, marten, woodpeckers, spotted owls, barred owl, ruffed grouse, fish and lynx. The issues were treated by applying prescriptions to appropriate areas of the forest in order to provide habitat which could support more or less numbers than currently exist. Population numbers were estimated.

Components of the recreation issues centered around providing a wide spectrum of opportunities for both undeveloped and developed recreation. The alternatives varied in the amount and location of different kinds of recreation opportunities which they offered over the long-term. The Recreation Opportunity Spectrum (ROS) system was used to measure different setting and opportunities offered (e.g. primitive, semi-primitive, nonmotorized, etc.).

The output levels were estimated and expressed in terms of both acres and millions of recreation visitor days per year by ROS class.

Related to the recreation issues are concerns about visual quality. These issues were addressed in the alternatives by applying prescriptions which provide for visual quality to different areas of the forest. The extent to which visual quality was provided for in each alternative was measured by the number of acres where visual quality objectives were met in sensitive scenic areas. The more sensitive areas were in the categories of retention and partial retention.

The future management of roadless areas is a major issue that was addressed by each alternative. The location of

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and the number of acres selected for maintenance of a natural appearing, unroaded condition was mapped for each alternative. The acres included with these specific areas were then constrained in FORPLAN. Roadless acres by alternative were expressed as mapped areas and total roadless acres by decade.

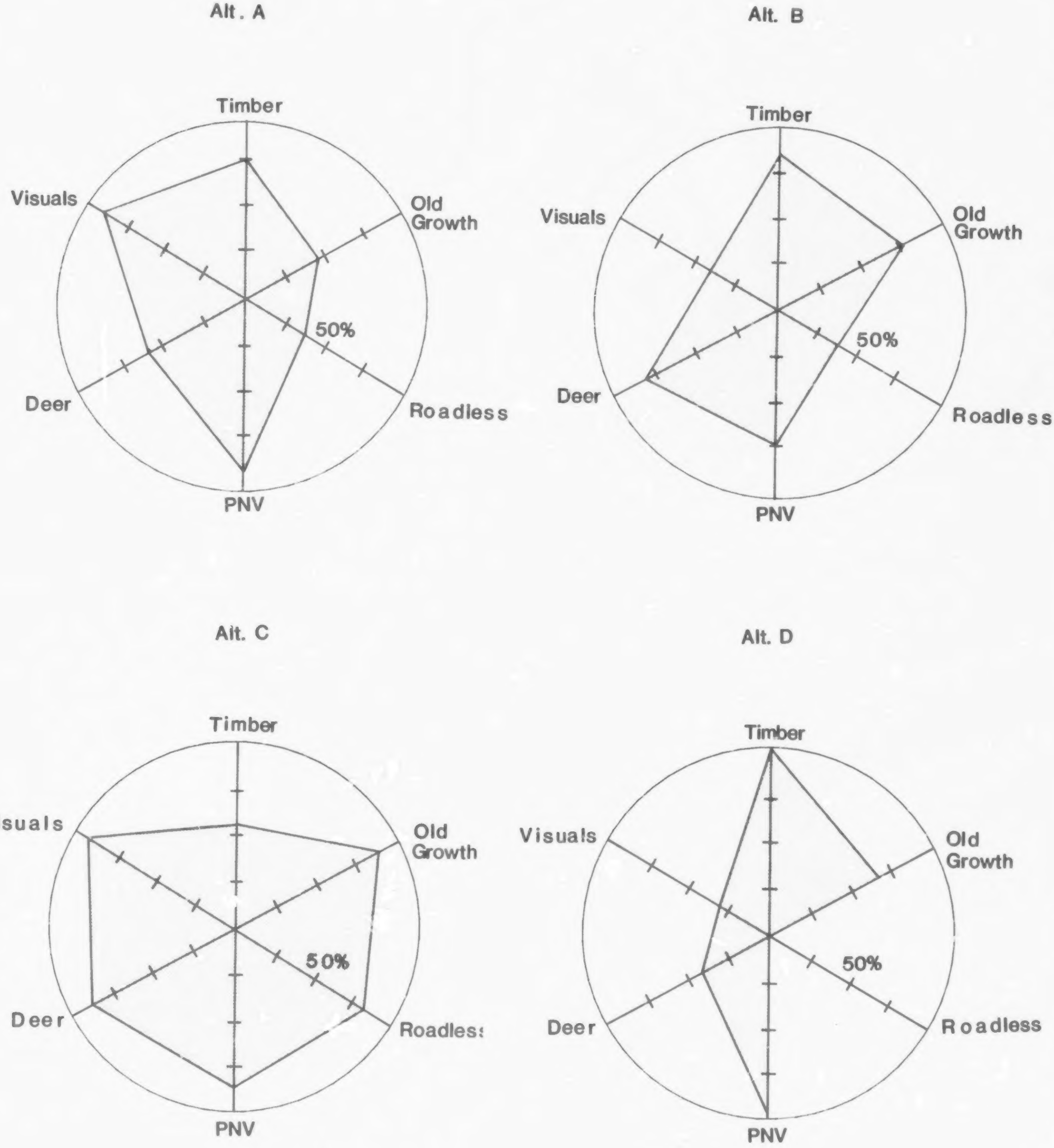
A broad issue encompasses lifestyles and economics. Many people live and/or recreate in North Central Washington because of the clean environment and the variety of recreation and job opportunities that are present. Many people are willing to sacrifice economic growth in favor of clean air and water, good fishing, and the freedom to cut personal use firewood. However, jobs and personal income are also a concern in relation to lifestyles. The consequences of the alternatives with respect to this broad issue were estimated by examining a variety of outputs and effects. They are 1) jobs, 2) recreation opportunity, 3) firewood, 4) visual quality, and 5) revenues and payments to the counties.

The other major concern, especially regionally and nationally, is economic efficiency. Some people want decreased government costs while others want increased receipts. Still others want decreased logging costs. The main thrust though, is concern about the Okanogan's several thousand acres of biologically suitable timber lands where timber management costs exceed expected revenues. This issue is sometimes referred to as "below cost timber sales."

As stated above, this issue was addressed by pricing most market and some non-market values and costing activities. Objective functions in some alternatives were to maximize PNV; while in others maximizing timber was the original objective function, followed by a rollover run with the timber volumes fixed and maximizing PNV as the objective function. Four alternatives, G, G-departure, C and I were formulated by constraining the acres where timber costs exceed timber value. These acres were constrained to non-timber producing prescriptions. Present net value is expressed in millions of dollars.

The figures displayed on the next five pages graphically portray the resolutions of the major issues and concerns of each alternative. The six axes are timber offered for sale (first decade); are of old growth outside designated Wilderness; area in unroaded recreation (called roadless on the figures); present net value; deer winter range habitat capability (in number of deer); and acres of retention and partial retention visual quality objectives. The length of each axis is 100% of the capable, available output or effect in question.

FIGURE B-1 Resolution of Major Issues and Concerns by Alternative.

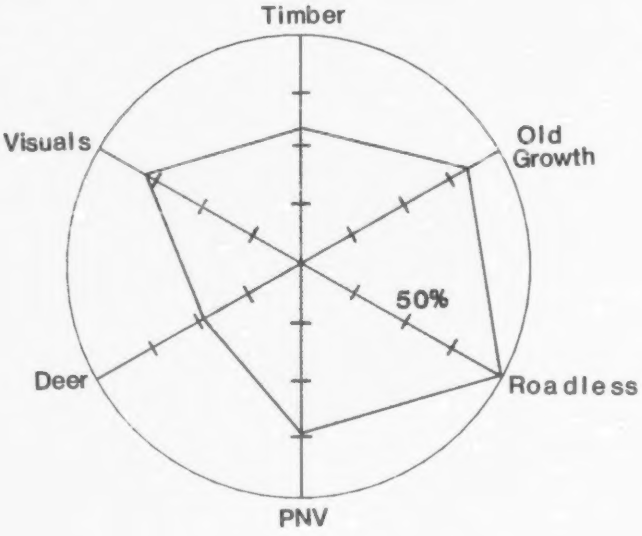

Alt. A

Alt. B

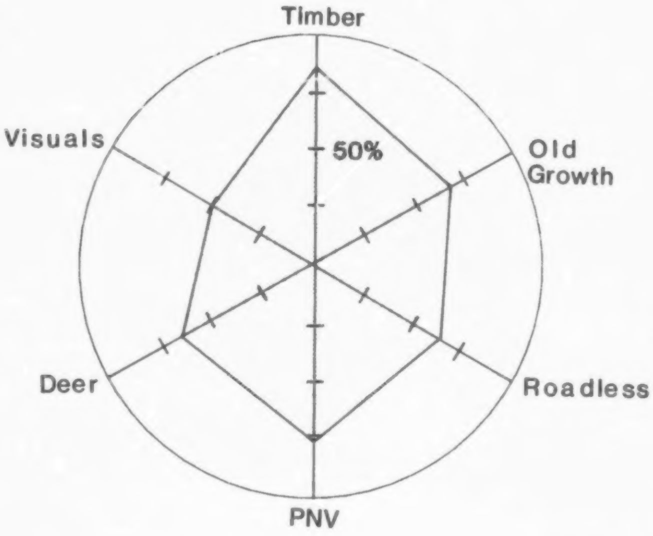
Alt. C

Alt. D

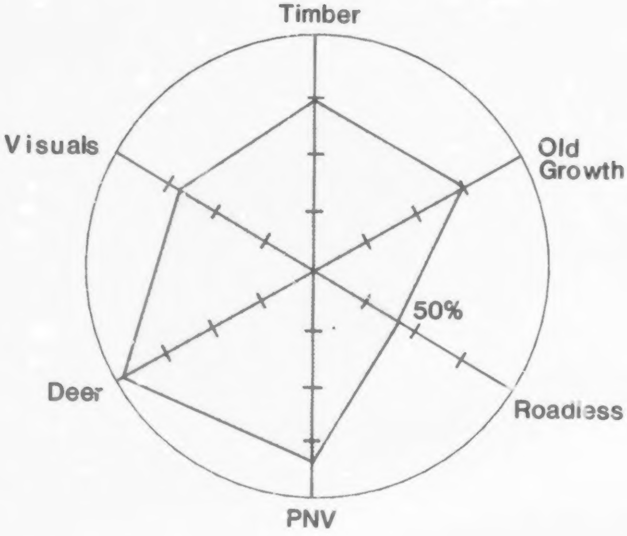
Alt. E



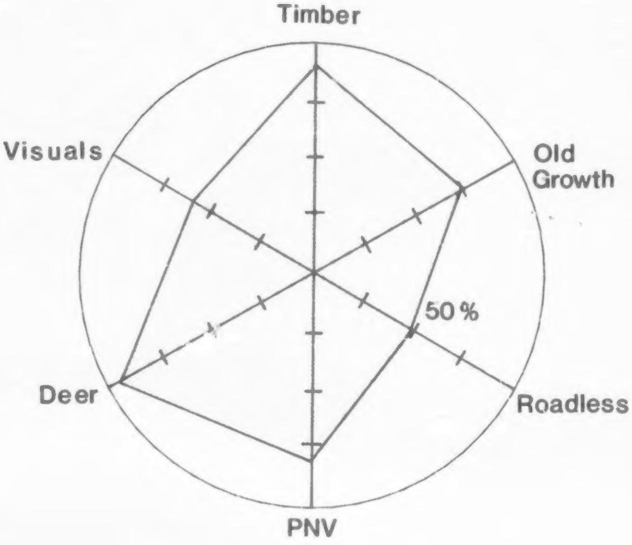
Alt. F



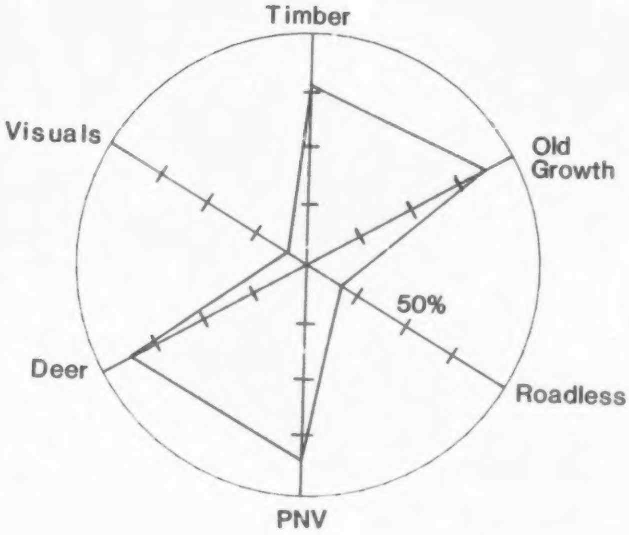
Alt. G



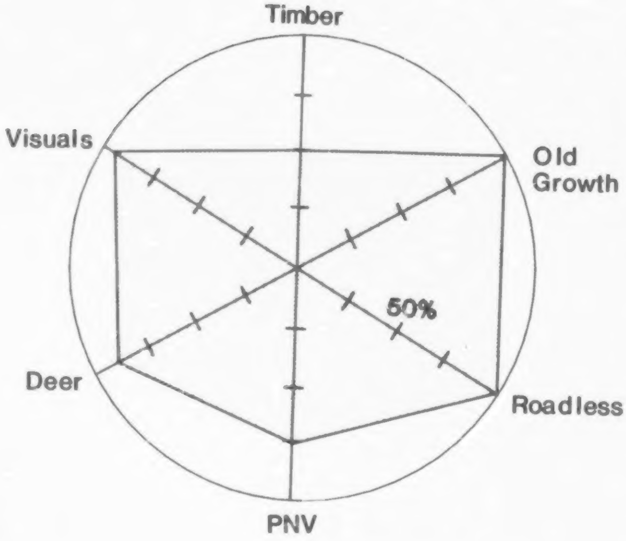
Alt. G Dep



Alt. H


Timber
Old Growth
Roadless
PNV
Deer
Visuals
50%

Alt. I


Timber
Old Growth
Roadless
PNV
Deer
Visuals
50%

4. Resource Outputs, Effects and Environmental Consequences

The implementation of any one of the alternatives will result in the production of certain outputs and effects and their associated environmental consequences. Some of the consequences are direct while others are indirect. Some of the consequences are short-term while others are cummulative or long-term. Chapter II of the DEIS presents a detailed description of the resource outputs and effects for each alternative. Chapter IV of the DEIS describes the associated environmental consequences. Much of the analysis performed to develop these outputs, effects and consequences is quite complex and is described in previous chapters of this appendix. Therefore, in order to fully understand the resource outputs, effects and environmental consequences associated with each alternative, and their derivation, it is recomended that Appendix B be read along with Chapters II and IV of the DEIS.

Tables II-3a, II-3b and II-7 of Chapter II in the DEIS present the direct, indirect and cummulative resource outputs and effects associated with each alternative and certain selected benchmarks. By examining Table II-1 of the DEIS (Comparison of Issue And Concern Resolution by Alternative) in conjunction with these tables, a better understanding of the relationship between issue resolution and the resulting outputs and effects for each alternative can be obtained. At the same time, it is also necessary to associate the anticipated environmental consequences that would result from the production of these outputs and effects.

The most significant environmental consequences are those associated with the manipulation of vegetation and access. Vegetation management, especially timber harvesting and road construction, result in changes in the appearance of the forest; changes in wildlife habitat; changes in the type and vigor of plants; the short-term creation of dust, smoke, and noise; and soil disturbances. The magnitude of these consequences varies between the alternatives depending on how many acres are harvested.

On areas of the forest where producing timber is the primary objective, existing old growth and mature tree stands will be replaced with new, younger stands. The trees in the long-term will be smaller and organized in a more uniform manner. There will be less dead and down material except in areas where it is specifically provided for. Therefore, as old and mature stands of trees are replaced with younger stands, overall plant and animal diversity shifts from species associated with old growth communities to species associated with younger communities. Also, as existing mature stands are replaced by stands of seedlings and saplings, more forage is available for grazing by domestic livestock and wildlife.

Microclimate change will be profound. On-site differences in temperature, moisture and wind lead to differences in plant and animal habitats.

All of the alternatives address the harvesting of lodgepole pine. Except with Current Direction, this could result in large areas of the forest being harvested over a fairly short period of time. Large harvest units could be visible even in areas where visual quality is important. In the short-term, these units will detract from the scenic quality of the area until the new stands begin to fill the harvest created openings, and the stumps and logging residues can no longer be seen. In addition, hiding cover for wildlife will also be reduced over the short-term in these areas. Habitat for snowshoe hare, a critical element in survival of lynx, will increase in the short and long-term from increased conversion of old lodgepole pine stands to young ones.

In the long-term, some of the alternatives require the development of roadless areas. This would introduce human activity into areas where little human activity presently occurs. This could disturb some species of wildlife and result in increased recreational use levels in areas adjacent to established wildernesses. Once an area is developed, its wilderness values are diminished, if not lost, and future options for allocating the area to wilderness are foregone. Roading unroaded areas also reduces the opportunity for unroaded dispersed recreation, but at the same time increases the opportunities to develop other resources such as timber or mineral resources which, in turn, have the potential to provide economic returns to the federal and local governments.

Ground disturbing activities will displace and compact soils but within acceptable limits as outlined by the standards and guidelines. Some compaction will occur, however, as a result of roads, skid trails and construction of facilities.

To different extents, the alternatives provide for livestock grazing. The higher the livestock grazing levels, the greater the chances are for competition between livestock and wildlife. Livestock use can also cause damage to young trees in plantations and result in increased reforestation costs, and some loss of tree growth. Also, vegetation is trampled in small isolated areas where livestock tend to concentrate near water sources or salt. However, livestock use levels in riparian zones are controlled to prevent damage to the vegetation and soils and to protect water quality.

Providing for different levels and types of recreation also affects other resources. Providing for undeveloped recreation reduces the amount of timber that could be harvested and limits other types of development such as geothermal. On the other hand, areas used for developed recreation are unusable by many species of wildlife. Also, managing an area for developed recreation results in concentrations of people which can cause soil compaction and has the potential to degrade water quality.

All of the alternatives have their associated social effects as well as environmental effects. For the most part, the social effects are centered around lifestyles and expectations of forest users. A broad and diverse public is interested in and uses the Okanogan Forest. The major social concerns are related to visual quality, recreation diversity, personal use firewood and economics. Concern has been expressed regarding the development of roadless areas and other specific locations on the forest. Some of the alternatives would tend to polarize people and communities. This is particularly true of both the high amenity and the high commodity alternatives and Alternative I because they are not well balanced regarding the development and use of the forest.

Alternatives with a commodity emphasis tend to result in fewer provisions for visual quality and dispersed recreation opportunity. On the other hand, an alternative with a commodity emphasis can result in more jobs and higher revenues. On the other hand, alternatives with an amenity emphasis do more to protect the visual quality on large areas of the forest, but limit the developed recreation opportunities. Jobs and revenues are not emphasized.

Table II-3a of the DEIS displays the average annual quantifiable resource outputs and effects by alternative. The table is quite comprehensive and will be referred to time and again throughout the remainder of this document. The following figures help to graphically summarize some of the information in this table which pertains to key issues.

Most of the outputs and effects for each alternative are displayed for the years 1986, 2000 and 2030. These can be interpreted as the average annual outputs for the decadal planning periods they represent. The year 1986 is the first year of the the first decade of the plan (1986-1995). The year 2000 is the mid-point of the second decade (1996-2005), and 2030 is the mid-point of the fifth decade (2026-2035). These years are displayed for their coverage of both short and long-term outputs and effects.

Note that the output levels for some resources during the first time period are similiar across all of the alternatives. This makes it appear as though there are no differences between the alternatives. However, there usually are. The Unroaded Recreation outputs on the first page of the table are a good example for this discussion. The projected levels across all alternatives during 1986 vary from 76,000 RVD's for Alternative F to 103,000 RVDs for Alternative E, a relatively narrow range. However, there is quite a wide range of differences between these alternatives in the amount and location of lands managed for recreation purposes. The future projections of recreation use for each alternative are based largely on three factors: a) projected differences in settings; b) resource goals and objectives of each alternative; and c) the projected population levels for the State of Washington and its resulting effects on demand for recreation use on the forest. Consequently, the short-term differences in the amount of recreation use between the alternatives are relatively small. The differences become greater over time as the different carrying capacities and recreation emphases between the alternatives begin to affect the recreation use levels and patterns on the forest. In essence, many of the consequences resulting from decisions made in the alternatives will not be apparent in the short-term, but will become more noticeable in the longrun outputs and effects. The same is true for the projections of range use and wildlife population changes where response to land use management decisions is often more gradual than abrupt.

Many of the outputs and effects that would result from the implementation of an alternative can not be easily expressed in quantitative terms. For these cases, qualitative statements are necessary to summarize the respective consequences of each alternative. Table II-3b (Chapter II, DEIS) presents a tabular comparison of the qualitative outputs and effects associated with each of the alternatives.

5. Differences in Present Net Value (PNV)

Present Net Value (PNV) estimates the potential economic effectiveness of management of the land and water resources of the forest of each alternative. Present Net Value is calculated by subtracting costs from the economic or priced benefits that would be produced under a planning alternative, after both costs and benefits are appropriately discounted to the present (see Appendix B, Chapter IV). PNV measures the net economic value of outputs for which dollar values are calculated. Economic costs and benefits and net economic and cash values are important components of net public benefits, the criterion used to evaluate each of the alternatives.

The alternatives are ranked by decreasing PNV in Table II-4 (see Chapter II, DEIS). The Max PNV benchmark is provided as a reference point.

As PNV decreases across alternatives, discounted costs and discounted economic benefits do not necessarily decrease too. No general pattern is evident because changes in economic values are due to dispersed recreation, timber harvest, associated road costs, forage and developed recreation. Alternatives have different mixes of these values.

However, timber production dominates both benefits and costs. Table II-5 (Chapter II, DEIS) shows the economic benefits associated with timber, recreation and forage are always greater than the costs directly attributable to producing those benefits. However, because some timber and range uses may be somewhat overestimated, the net benefits may be somewhat overestimated.

In general, as timber harvests decrease, the economic costs decrease, and benefits decrease at a slower rate. Economic costs decrease by 54 percent from the alternative that most emphasizes timber to the one that least emphasizes timber. Costs also decrease, but only by 33 percent. Costs per unit timber sold vary across alternatives and are highest in B and I and lowest in G (departure). Other resource goals of some alternatives lead to increases in the unit costs of timber production by (1) including harvests in areas of relatively low productivity and high access costs, and (2) increasing road-related mitigation expenditures to protect non-timber resources.

The economic values displayed do not include those associated with possible future minerals production. Substantial mineral resources are known to exist on the forest, but the timing of their development and the quantities that will be extracted are highly speculative. These economic values, however, may well differ significantly among alternatives. (See Table II-3a and Chapter III, Minerals of the DEIS.)

6. Differences in Costs

On the Okanogan Forest, essentially all capital investment costs are for road construction/reconstruction and activities associated with continuous timber production. The total annual budget costs for all alternatives, except C, E and I, are higher than the average 1982 expenditure level of $9.3 million.

Alternatives that emphasize timber production have higher road and timber management costs; those that emphasize nonmarket objectives have higher recreation costs. Total road costs decrease in all alternatives after the second decade because most initial road construction and reconstruction will have been completed.

7. Differences in Economic Benefits and Cash Flows

Market resources include timber, livestock grazing, campgrounds, minerals and special uses for which fees are collected. The displayed economic benefits for market resources include actual dollar receipts plus additional assigned dollar values for livestock grazing and campground use. Nonmarket resource values are dollar values assigned to dispersed, wilderness and wildlife-dependent recreation. The purpose of assigning dollar values is to reflect the full economic value even though none or only part of that value associated with particular resources actually are collected as fees under current laws and policies. Economic benefits increase for the alternatives through the planning period as both timber and recreation outputs and unit prices increase.

Overall economic efficiency of alternatives can be measured by comparing economic benefits to costs. Cash receipts and costs measure actual flows to and from the U.S. Treasury and the taxpayers. On the Okanogan Forest, the major difference among both economic values and cash receipts is due to differing levels of timber production. Net cash flows for the first and fifth decades by alternative are displayed in Table II-6.

Receipts other than those from timber sales are expected to be relatively minor. Gross receipts are projected to increase over time primarily because of real stumpage price increases and increasing levels of stumpage sales.

That portion of the economic benefits that would not be collected as cash receipts would vary slightly across alternatives. This is because noncash economic benefits are largely those associated with dispersed recreation. Dispersed recreation use would be little influenced by the selected management alternative, but the setting would be altered depending on the amount of resource development activities. The following section, Major Trade-offs Among Alternatives, discusses this by alternative. The increases in noncash benefits by the fifth decade primarily reflect anticipated increases in population.

8. Benchmarks

The benchmarks are displayed in the DEIS, Chapter II, Table II-3a. On the Okanogan National Forest, differences in PNV of the benchmarks are attributable to:

a) The higher value of timber relative to other resources,

b) The higher value of mixed conifer stands relative to lodgepole pine stands,

c) The value of recreation use and wildlife/fish use relative to commodity use,

d) The higher value of primitive and semi-primitive recreation use relative to roaded recreation use,

e) The higher value of scenic roaded use relative to use of non-scenic areas, and

f) The costs of roading and logging, especially on some sites where those costs exceed the commercial values of the lands.

A minor difference between alternatives is the net value of range use.

These difference are demonstrated best by the following explanation of decreases in PNV of the alternatives.

D. Analysis of Constraints Within Alternatives

The model constraints to achieve objectives are explained in Chapter VII of Appendix B. A chart is provided in Chapter VI to guide the reader through the analysis and results of each policy constraint. Policy constraints include minimum management requirements, non-declining even flow, and utilization standards. In addition, the effects of assigning dollar prices to non-market values are explored.

For each constraint of each alternative an interpretation is given which is based on the differences in PNV of the benchmarks.

Alternative A (Current Direction)

Alternative A has the highest PNV of the alternatives, because timber activities are concentrated in the most valuable timber types. Further, the noncash value of recreation use this alternative would provide is quite high.

Timber accessibility, harvest scheduling (departure) and species mix contribute to the high timber value.

For Alternative A, harvests are concentrated in more valuable timber, in earlier time periods. By departing from non-declining yield, current harvest and current values are maximized. Therefore, these high values, though discounted somewhat, remain high because they occur so early in the planning period. This alternative has fewer acres of non-stocked lands in need of regeneration in the first decades, so costs are lower.

Lodgepole pine stands, which are of low value and have higher road and logging costs per unit, are harvested at a very low level. Road costs are relatively low in this alternative because roads are not needed to access lodgepole pine stands.

Developed recreation, dispersed recreation and visual quality objectives are emphasized in this alternative. Only Alternative C has higher dispersed recreation values.

Average annual net returns are $11.6 million in the first decade and rise to $13.5 million in the fifth decade. High timber harvests would lead to a large contribution to community employment and income and high cash payments to the county.

Alternative C

This alternative is second to Alternative A in PNV. It differs chiefly because of its emphasis on amenities and low level of timber harvest.

Lodgepole pine, a low value species, is a major component of the timber harvested. Also, the timber produced is often tightly constrained for amenities, particularly wildlife and visual objectives. Therefore, the timber that is produced is at a higher cost. More acres of nonstocked land need to be regenerated in this alternative than A, so costs for this are higher.

Harvests are concentrated on gentle ground; moderate, steep and roadless areas are avoided. Timber harvesting costs are relatively low because activities take place on gentle slopes (lower logging costs) and in higher valued stands.

Dispersed recreation, developed recreation, visual quality objectives and wildlife are emphasized in this alternative. The benefits generated from the amenity resource groups have the highest value of all alternatives.

Net cash receipts would be $10.4 million in the first decade and increase to $14.4 million in the fifth decade. The low timber harvest would lead to about 29 percent fewer jobs and reduced income to the community. Payments to the county would decrease by $300,000.

Alternative G (Departure)

Alternative G (departure) is ranked third for PNV. Discounted benefits are less than A; discounted costs are higher. Alternative G (departure) departs from non-declining yield, so current harvest and values are maximized early. Discounted values remain high because of the short discounted period.

Road costs, logging costs and species mix contribute to overall higher costs than Alternative A. Alternative G (departure) has a significantly larger investment in arterial and collector road systems in the first two decades. Logging costs are higher because moderate to steep ground and unroaded areas are accessed. More lodgepole pine stands, which are associated with lower values and higher costs, are harvested.

Discounted benefits are less than A. Overall, timber benefits are slightly less: Alternative G (departure) harvests more volume than A, but enters the lower value lodgepole pine stands. Recreation benefits are slightly lower than A, because visual constraints are relaxed, but still very high. Hunting in the Methow Valley contributes significantly to the large number of recreation visitor days (RVD's).

Average annual net returns are $10.7 million in the first decade and rise to $12.3 million in the fifth decade. The large timber harvest and road investment program would significantly contribute to community stability. Jobs would increase by 13 percent and income by 10 percent in the first decade. After that, a reduction is expected because of the decline in yield in future decades. Payments to the county would increase by $100,000 in the first decade.

Alternative G

Alternative G is ranked fourth in terms of PNV. Discounted benefits are lower and costs are higher than Alternative A. Alternative G has a non-declining yield schedule, so the effects of discounting are evident. The higher values occur in the future, not necessarily in the first decade, so values are discounted longer and PNV is less.

Road costs, logging costs and species mix contribute to overall higher costs than Alternative A. Alternative G has a significantly larger investment in arterial and collector road systems in the first two decades. Road standards are higher in this alternative because of the high timber and recreation use. Logging costs are higher because moderate to steep ground and unroaded areas are accessed. About seven times as many acres of lodgepole pine stands, which are associated with lower values and higher costs, are harvested.

Discounted benefits are less than A. Timber benefits are less because Alternative G harvests less volume than A and enters the lower value lodgepole pine stands. Recreation benefits are slightly lower than A, because visual constraints are relaxed and RVD's are of lower value, but overall, recreation benefits are still very high.

Average annual net returns are $9.6 million in the first decade and rise to $12.4 million in the fifth decade. The reduced timber harvest would adversely affect community stability. Jobs would decrease by 8 percent and income by 10 percent in the first decade. Payments to the county would decrease by $200,000.

Alternative H

Alternative H is ranked fifth in terms of PNV. Discounted benefits are lower and costs are higher than Alternative A. Alternative H has a non-declining yield schedule, so the effects of discounting are evident. The higher values occur in the future, not necessarily in the first decade, so values are discounted longer and PNV is less.

Road costs, logging costs and species mix contribute to overall higher costs than Alternative A. Alternative H has a significantly larger investment in arterial and collector road systems in the first two decades. Virtually all the roadless areas would be entered, so road costs would be high. Logging costs are higher because moderate to steep ground and unroaded areas are accessed. Twice as many acres of nonstocked lands need to be regenerated as opposed to A and precommercial thinning investments are higher. About ten times as many lodgepole pine stands, which are associated with lower values and higher costs, are harvested.

Discounted benefits are less than A. Timber benefits are less because Alternative H harvests less volume than A and enters the lower value lodgepole pine stands in the first decade. Over the long run, timber value would be higher than Alternative A, because Alternative H remains constant in terms of timber harvest volume, and Alternative A declines after the first decade. Dispersed recreation values are lower than A because of so much roaded area.

Average annual net returns are $9.6 million in the first decade and rise to $12.2 million in the fifth decade. The reduced timber harvest would adversely affect the economic community. Jobs would decrease 4 percent and income 6 percent in the first decade. Payments to the county would decrease by $100,000.

Alternative I

Alternative I is ranked sixth in terms of PNV. Discounted benefits and costs are lower than Alternative A. Alternative I has a non-declining yield schedule, so the effects of discounting are evident. The higher values occur in the future, not necessarily in the first decade, so values are discounted longer and PNV is less.

Overall, discounted costs are less than Alternative A, because timber harvest is so low. But road costs, logging costs and species mix contribute to higher per unit costs than Alternative A. Alternative I has a larger investment in arterial and collector road systems in the first two decades. All roadless areas would remain unroaded. Arterial and collector road costs are higher because activities are concentrated in the remaining roaded areas. Timber volume is the lowest in this alternative, though the timber harvested has relatively high value. Unit costs are very high because of the many amenity objectives, such as wildlife and recreation.

Discounted benefits are less than A. Timber benefits are less because Alternative I harvests less volume than A and enters the lower value lodgepole pine stands in the first decade. Dispersed recreation values are slightly less than Alternative A, though still very high. Recreation volume is reduced somewhat, but is valued highly because of so much unroaded area.

Average annual net returns are $9.0 million in the first decade and rise to $12.4 million in the fifth decade. The reduced timber harvest would significantly adversely affect the economic community. Jobs would decrease 43 percent and income 42 percent in the first decade. County receipts would decrease by $500,000.

Alternative D

Alternative D is ranked seventh in terms of PNV. Discounted benefits are higher than Alternative A, but more than offset by the greater increase in costs. Alternative D has a non-declining yield schedule, so the effects of discounting are evident. The higher values occur in the future, not necessarily in the first decade, so values are discounted longer and PNV is less.

Overall, discounted costs are much higher than Alternative A, because timber harvest is so high. Road costs, logging costs and species mix contribute to higher per unit costs than Alternative A. Alternative D has a larger investment in arterial and collector road systems in the first two decades. Entering the roadless areas requires more local road construction and reconstruction. Logging costs are high because three times as many acres of nonstocked lands need to be regenerated, eight times as many lodgepole pine acres are harvested, and a greater investment is required for precommercial thinning.

Discounted benefits are higher than Alternative A, because more timber is harvested in this alternative. Dispersed recreation use is high, but values are the lowest because so much of the area is roaded. Also, because of the high timber harvest, forage values increase in this alternative, the highest of all alternatives.

Average annual net returns are $9.9 million in the first decade and increase slightly to $10.4 million in the fifth decade. The increase timber harvest would significantly affect the economic community. Jobs would increase 31 percent and income 25 percent in the first decade. County receipts would increase the most, by $300,000.

Alternative F

Alternative F is ranked eighth in terms of PNV. Discounted costs and benefits are greater than Alternative A. Alternative F has a non-declining yield schedule, so the effects of discounting are evident. The higher values occur in the future, not necessarily in the first decade, so values are discounted longer and PNV is less.

Discounted costs are higher than Alternative A because timber volume harvest and its associated costs are higher. Costs would be greater because some roadless areas would be entered, more cable and helicopter ground would be logged, and deer winter range and other habitat objectives would be constraining.

Discounted benefits are higher than Alternative A, because more timber is harvested in this alternative. Dispersed recreation values are lower because of the altered state of the land (i.e. more roaded areas).

Average annual net returns are $7.0 million in the first decade and increase to $10.5 million in the fifth decade. The increased timber harvest would slightly affect the economic community. Jobs would decrease 7 percent and income 5 percent in the first decade. County receipts would increase slightly, $100,000.

Alternative E

Alternative E is ranked ninth in terms of PNV. Discounted costs are slightly lower and benefits much less than Alternative A. Alternative E has a non-declining yield schedule, so the effects of discounting are evident. The higher values occur in the future, not necessarily in the first decade, so values are discounted longer and PNV is less.

Overall, discounted costs are lower than Alternative A, because timber harvest is lower. Road costs, logging costs and species mix contribute to higher per unit costs than Alternative A. Alternative E has a larger investment in arterial and collector road systems in the first two decades than A. Across alternatives, road costs are relatively low because no roadless areas would be entered, and roads would be built and maintained for a single use. Unit management costs are higher because Alternative E has proportionally more acres of (high logging cost) steep ground. Therefore, higher thinning, reforestation and harvest costs would result.

The acres managed for intensive timber management would have very rapid turnover and high growth per acre. Future trees would not contribute as much value. Logging costs are high because two to three times as many lodgepole pine acres are harvested.

Discounted benefits are lower than Alternative A, because less timber is harvested in this alternative. Dispersed recreation values are lower because so much of it is in an altered state outside the roadless areas. Wildlife and fish user days would also decrease because of the altered environment outside the roadless areas and the increase in roadless areas. Developed recreation benefits are the lowest of any alternative.

Average annual net returns are $8.9 million in the first decade and increase to $11.5 million in the fifth decade. The decreased timber harvest would affect the economic community. Jobs would decrease 19 percent and income 19 percent in the first decade. County receipts would decrease by $200,000.

Alternative B

Alternative B is ranked tenth in terms of PNV. Discounted benefits and costs are higher than Alternative A. Alternative B has a non-declining yield schedule, so the effects of discounting are evident. The higher values occur in the future, not necessarily in the first decade, so values are discounted longer and PNV is less.

Overall, discounted costs are higher than Alternative A, because timber harvest is higher. Road costs, logging costs and species mix contribute to higher per unit costs and overall costs than Alternative A. Alternative B has a larger investment in arterial and collector road systems in the first two decades. Steeper ground and unroaded areas would be accessed. Also, more demands would be made on roads because of the conflict of use and mixed traffic. Logging costs are high because three times as many acres of nonstocked lands need to be regenerated, nine times as many lodgepole pine acres are harvested, proportionately more steep ground is harvested and a greater investment is required for precommercial thinning.

Discounted benefits are higher than Alternative A, because more timber is harvested in this alternative. Dispersed recreation values are lower because so much of the area is roaded.

Average annual net returns are $8.2 million in the first decade and increase slightly to $9.2 million in the fifth decade. The increased timber harvest would affect the economic community. Jobs would increase 8 percent and income 6 percent in the first decade. County receipts would increase by $100,000.

APPENDIX C

OKANOGAN NATIONAL FOREST ROADLESS AREAS

TABLE C-1 Summary of Existing Roadless Area Acres

Area Name and (Number)	RARE II Acres	Deleted Acres	Reason for Deletion	Current Acres
Jackson Creek (6001)	13,150	a) 2272	Logging with roads	
		b) 77	Logging with roads	
		c) 583	Logging with roads	
				10,218
Bodie Mountain (6002)	6,390	a) 71	Logging with roads	
		b) 275	Logging with roads	
				6,044
Clackamas Mountain (6003)	15,125			15,125
Hungry Ridge (6015)	13,990	a) 512	Logging with roads	
		b) 64	Logging with roads	
		c) 50	Logging with roads	
		d) 415	Logging with roads	
		e) 95	Logging with roads	
		f) 403	Logging with roads	
				12,451
Black Canyon (6016)	13,600	a) 370	Logging with roads	
		b) 100	Logging with roads	
		c) 32	Logging with roads	
		d) 183	Logging with roads	
				12,915
South Ridge (6017)	6,200	a) 32	Logging with roads	
		b) 77	Logging with roads	
		c) 391	Logging with roads	
				5,700
Granite Mountain (6018)	41,780	a) 754	Logging with roads	
		b) 178	Logging with roads	
		c) 83	Logging with roads	
		d) 920	Logging with roads	
		e) 256	Logging with roads	
		f) 114	Logging with roads	
		g) 601	Logging with roads	
		h) 467	Logging with roads	
		i) 754	Logging with roads	
		j) 32	Logging with roads	
		k) 205	Logging with roads	
				37,416

Area Name and (Number)	RARE II Acres	Deleted Acres	Reason for Deletion	Current Acres
Tiffany (6019)	25,000	a) 333	Logging with roads	
		b) 640	Logging with roads	24,027
Mt. Bonaparte (6021)	13,400			13,400
Long Draw (6023)	8,600	a) 217	Logging with roads	
		b) 2901	WA Wilderness Act	5,482
Long Swamp (6024)	102,330	a) 184	Logging with roads	
		b) 21606	WA Wilderness Act	80,540
Pasayten Rim (6025)	15,410			15,410
Liberty Bell (6026)	112,430			112,430
Sawtooth (6027)	230,900	a) 15	Logging with roads	
		b) 15	Logging with roads	
		c) 128	Logging with roads	
		d) 256	Logging with roads	
		e) 77	Logging with roads	
		f) 20	Logging with roads	
		g) 397	Logging with roads	
		h) 525	Logging with roads	
		i) 263	Logging with roads	
		j) 135	Logging with roads	
		k) 544	Logging with roads	
		l) 1619	Logging with roads	
		m) 455	Logging with roads	
		n) 20	Logging with roads	
		o) 32	Logging with roads	
		p) 96189	WA Wilderness Act	130,210
Total	625,005	143,637		481,368

Table C-2 Previously Identified Roadless Areas No Longer Meeting Criteria

Area Name and (Number)	RARE II Acres	Deleted Acres	Reason for Deletion	Current Acres
Dugout (6022)	6,700	a) 6700	Logging with roads	-0-

JACKSON CREEK - 6001

10,218 Acres

1. History

For this planning cycle, the Okanogan National Forest is the lead planning forest for this Roadless Area.

The area was originally inventoried as roadless during RARE I. In 1972, a timber sale reduced the size of the area by approximately 1,800 acres. The 1979 RARE II process allocated the area to non-wilderness management. The 1979 Tonasket Unit Land Management Plan allocated approximately 9,300 acres to Wildlife Management and approximately 3,300 acres to Timber/Forage Management. Since 1979, approximately 2,900 acres have been impacted by roads and logging, mostly in the Timber/Forage Management allocation.

2. Description (Existing Conditions)

a. Location and Access - The area is located northeast of Tonasket in the northeast and northwest corners of the Okanogan and Colville National Forests respectively. Okanogan National Forest lands in Okanogan County make up approximately 7,250 acres and Colville National Forest lands in Ferry County make up the rest. From Tonasket, access is provided over State Highway 20, County Road 9495 and a National Forest road in Nicholson Creek.

b. Topography - Topography ranges from moderate slopes in the upper Cedar Creek drainage to rugged in the Jackson and Little Jackson Creek drainages and the Kettle River Breaks. About 75% of the area drains north into the Kettle River. Elevations range from approximately 2,000 to 3,800 feet.

c. Soils and Soil Types - Soils are derived primarily from glacial till. Areas of coarse textured soils may be intermixed with areas of fine textured lacustrine soils. These soils generally have high infiltration rates.

Coarse textured soils have low to moderate erosion hazards and are considered generally stable for management activities. Fine textured soils have a high mass erosion hazard when undercut.

d. Vegetation - The north draining portion of the area is generally covered with trees except where rock outcrops occur. Principal tree species are Douglas-fir, western larch and ponderosa pine. Lodgepole pine, subalpine fir and Engelmann spruce are also found. South draining areas have many open grass slopes with tree stringers in draws and on north slopes. Vegetation diversity is greater than for the remain-

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JACKSON CREEK
ROADLESS AREA (6001)

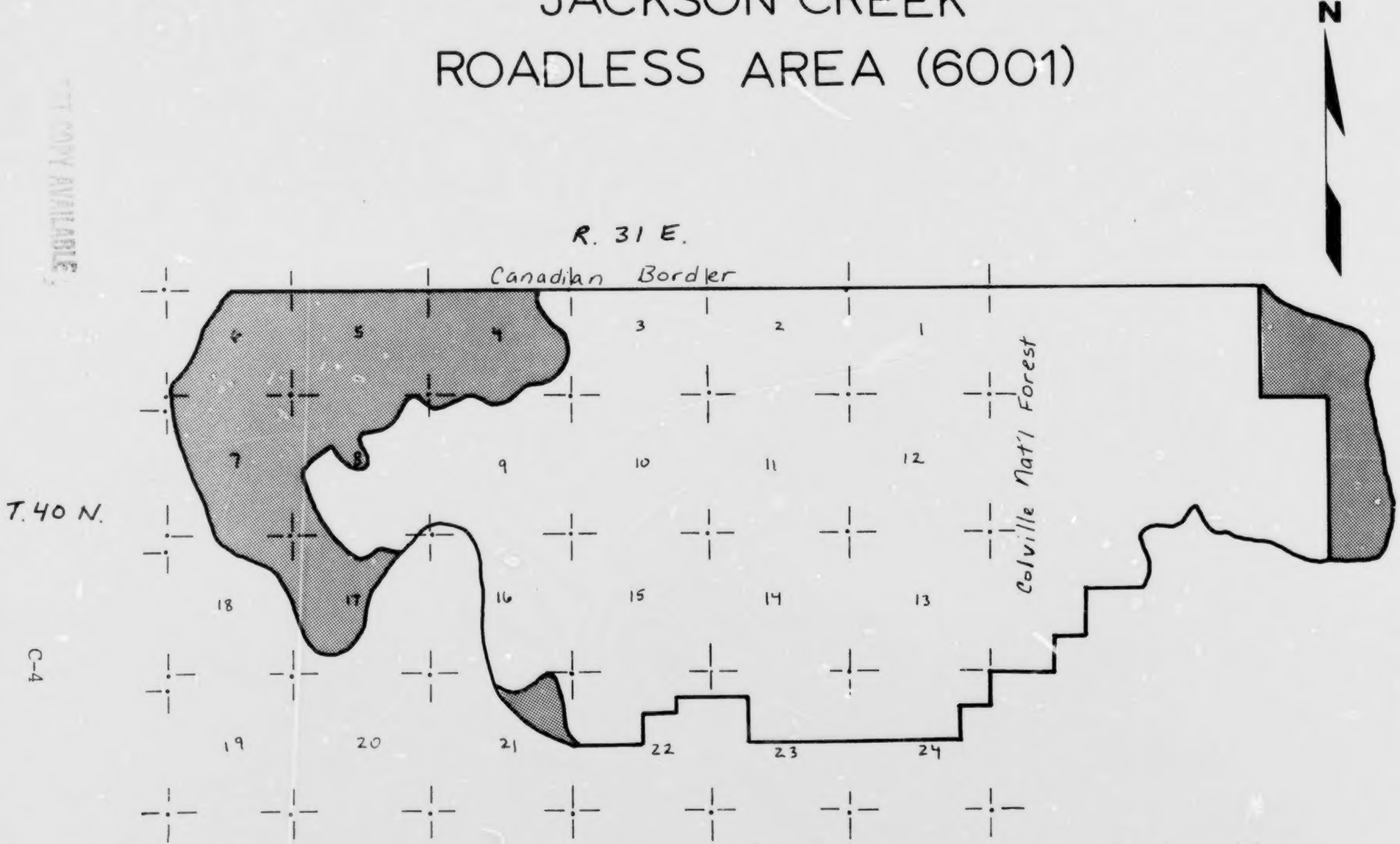
N
R. 31 E.
Canadian Border
T. 40 N.
Colville Nat'l Forest
6
5
4
3
2
1
7
8
9
10
11
12
18
17
16
15
14
13
19
20
21
22
23
24

FIGURE C-1

▨ Areas Deleted Because of Management Activities

Scale 1:62,500 (1" ≈ 1 mile)

ing eastern portion of the Okanogan National Forest, especially in the rockier upper portions of northern facing drainages.

e. Ecosystem Types - The area is considered spruce-fir forest using Bailey's classification. Under Kuchler's classification, the area is mapped as cedar-hemlock forest. The Forest Service area ecologist believes the area is better classified as Douglas-fir.

3. Capability (Presence of Wilderness Characteristics)

a. Manageability and Boundaries - The relatively small size of the area and the fact that it is completely surrounded by major roads would make management as wilderness difficult. Placing boundaries on readily identified features would greatly reduce the size of the area and further reduce its' capability for wilderness.

b. Natural Integrity, Appearance and Surroundings - The major impact on the natural integrity and appearance of the area are the old road grades along some drainages and the remains of an old mill and cabins utilized in past tie logging operations. The road beds are nearly obscured and the mill site and cabins have deteriorated to the point they are no longer obtrusive signs of human use. Some vegetation diversity exists. Topography is not greatly different from surrounding areas.

c. Opportunities for Solitude, Primitive Recreation and Challenge - The area gives moderate opportunities for solitude. Its' relatively small size, gentle open south slopes, along with nearby roads limit the opportunities for solitude. These same factors limit the opportunity for primitive recreation. Few challenges await the visitor.

4. Availability (Other Resource Potentials and Management Considerations)

a. Recreation - Most of the area provides Semi-Primitive, Non-Motorized recreation opportunities with a small amount of Roaded Natural opportunity provided. There are no special recreation features and the area does not lend itself to the establishment of developed sites. There are no system trails in the area. Some old tie logging roads are used as trails and are partially maintained by hunters and an occasional hiker. Present recreation use levels are low and consists generally of hunters.

b. Wildlife - There are no known threatened, endangered or sensitive animals in the area which are on State, Federal or Forest Service lists. Most of the area is high density deer winter range, where both mule and white-tailed deer concentrate during most winters. Here dense conifers, which pro-

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vide protection from both deep snow and cold, and available forage are vital to these herds. Approximately 1,500 to 2,000 acres of mixed conifer old growth exists, providing some of the most productive habitat types for wildlife. High snag levels provide excellent habitat for many cavity dwelling animals. At least one ridge provides winter habitat for blue grouse. Numerous other wildlife common to the two National Forests inhabit the area.

c. Water - The major stream in the area is Jackson Creek, which drains into Canada. There is no agreement regarding minimum stream flow of Jackson Creek into Canada. Currently, no water right claims are listed with the Washington State Department of Ecology.

Water is of high quality. There are no known limitations for potential water uses in the area.

Water yield in the area is estimated at less than 1000 acre feet/year. Much of this flow occurs during the spring runoff. During extreme dry periods, Jackson Creek may not flow. Potential for increasing stream flow from vegetative manipulation is low.

There are no existing power withdrawals, proposed impoundments or known Federal Energy Regulatory Commission permits or licenses outstanding. There are no streamflow measuring sites.

d. Range - The Okanogan National Forest portion of the area is within one grazing unit of the Cedar Cattle Allotment. Of the 24,744 acres within the allotment 1,400 acres is classified as unsuitable and the remaining 23,344 is suitable. The allotment is grazed by 500 head of cattle for 3,046 animal unit months under a deferred rotation management system. The Colville National Forest portion of the area is within the Graphite Cattle Allotment. Approximately 16 percent of the land within this allotment is unsuited for grazing. This allotment is grazed under a season-long management system.

e. Ecological - There are no known threatened, endangered or sensitive plants in the area which are on State, Federal or Forest Service lists.

f. Timber - The area contains approximately 4,200 acres of suitable forest land. The majority of these lands support mixed conifer stands. There is approximately 5.7 million cubic feet (28.2 million board feet) of standing merchantable volume. Potential timber yield is approximately 1.7 million cubic feet (8.3 million board feet) per decade.

There are no timber sales planned in the area through 1989 on the current Timber Sale Plan.

g. Minerals and Energy - Approximately 500 acres of land on the Colville National Forest portion of the area has high potential for exploration and development of gold. The Okanogan portion of the area has medium to low potential for gold, silver and tungsten. No mineral production is known from the area. Two claim groups totaling 56 claims and approximately 1,100 acres exist and are being actively explored. No outstanding mineral leases are present.

h. Cultural - The Cultural Resource Overview of the Tonasket Planning Unit (Uebelacker 1978) identified evidence of past tie logging activity in the remnants of a former mill site, tie cutters' cabins and road grades. Evidence of the trail used to smuggle alcohol between the U.S. and Canada during the prohibition era was also identified.

i. Land Use - There are no authorized land uses in the area.

j. Fire - The area experienced 13 lightning and no human-caused fires for the period 1970-1979. This represents one of the highest fire occurrence rates on the National Forest. The primary factors associated with this high rate is the predominance of annual grass fuel types associated with dry site stands of Douglas-fir and ponderosa pine.

The current fire suppression strategy is to control all wildfires based on the area's proximity to Canada and to protect the commercial forest land found adjacent to the area (USDA 1983).

Application and use of unplanned ignitions (re. lightning and human-caused) to accomplish other resource objectives is not permitted under the current management direction.

k. Insects and Disease - During the past 5 years, very little insect activity was observed during annual surveys. Dwarf mistletoes are common in Douglas-fir stands. The nature and extent of root rot diseases is not known.

l. Private Lands - There is no private land within the area and no known outstanding subsurface rights.

5. Need

a. Nearby Wilderness Areas - The area is approximately 80 air miles west of the Salmo-Priest Wilderness on the Colville National Forest, approximately 50 air miles east of the Pasayten Wilderness and approximately 100 air miles northeast of the Lake Chelan-Sawtooth Wilderness.

b. Distance From Major Population Centers - The area is approximately 195 air miles northeast of Seattle and approximately 120 air miles northwest of Spokane.

c. Need for Ecosystem Representation - There are no unique ecosytems represented in the area. Ecosystems present are common throughout the area.

d. Proponent Interest, Public Input and Involvement - During the RARE II process, over 3,900 people expressed their preference for allocation of this area. Of the total, 5 percent preferred wilderness with or without boundary adjustments, 23 percent preferred further planning with or without boundary adjustments and 72 percent preferred non-wilderness.

Over 200 people provided comments to the 1978 Draft Environmental Impact Statement for the Tonasket Unit Land Management Plan. Fourteen people expressed their preference for allocation of this area. Of these, 3 preferred wilderness, 6 preferred further planning and 5 preferred non-wilderness.

Approximately 750 people provided comments to the 1982 Draft Environmental Impact Statement for the Okanogan National Forest Plan. Of these, 39 percent expressed a preference that this area be allocated to wilderness.

The area was considered for wilderness designation during discussion on the 1984 Washington Wilderness Bill but was not designated.

6. Environmental Consequences

The following table shows the disposition of the area by management area by alternative.

TABLE C-3 Jackson Creek Acres by Management Area by Alternative

Mgt.	Alternative									
Area	A(Current Dir)	B	C	D	E	F	G	G(DEP)	H	I
	thousand acres									
1	4.9	1.4	-	10.2	-	10.2	1.4	1.4	-	-
4	-	-	-	-	10.2	-	-	-	-	10.2
9	5.3	8.8	9.3	-	-	-	8.8	8.8	6.8	-
14	-	-	.9	-	-	-	-	-	3.4	-
Total	10.2	----------								

a. Soils and Water - The relative rating of soil and water impacts is shown in the following table.

TABLE C-4 Jackson Creek Soil and Water Impacts

Alt.	Riparian Areas (0-5 rating)	Mgt. Areas (0-10 rating)	Timber & Roads 0-13 rating)	Total
A	2	6	7	15
B	3	7	11	21
C	2	7	5	14
D	5	10	13	28
E	1	1	0	2
F	3	8	9	20
G	3	7	7	17
G (dep)	3	7	7	17
H	3	7	8	18
I	3	1	0	4

Cumulatively, Alternative D would have the most impact on soil and water resources in the area; followed by B, F, H, G and G (Departure), A, C, I and E.

Soil compaction would increase in Alternatives B, D and F as a direct result of the large number of acres in roads and timber harvest and the management area designation. The other alternatives would not result in major soil compaction increases. Increased soil compaction would reduce vegetative growth and establishment. This would reduce timber yields. Soil water infiltration rates would be reduced and surface soil erosion could increase. Soil ripping of landings and heavily used skid trails after logging operations would reduce the potential impacts. The probability of this practice working is very high.

Cumulatively, stream sediment loads would increase the most in Alternatives B, D and F because of the high levels of road construction and timber harvest. Alternatives E and I would have little to no effect on stream sedimentation loads because no roads would be constructed and no timber would be harvested. The other alternatives would not result in major stream sedimentation load increases although there would be temporary sedimentation load increases in small drainages as new roads were constructed. Stream sediment load increases in Alternatives B, D and F could reduce the water's utility for some uses. Irrigation could be made more expensive because siltation in irrigation canals would increase maintenance costs, decrease the amount of water flow and plug irrigation water delivery devices. Domestic water uses would be more expensive because water filtration would be required.

Only Alternative D would have the possibility of increasing stream water temperature. Temperature increases would be slight to moderate. Constant water temperatures would not be detrimental to other resources. A slight increase in water temperature would be benefical to the fisheries resource.

Higher water temperatures would not decrease the water's capability to be used in irrigation. Domestic water use may be slightly affected because some people have developed a taste for water at a specific temperature. Leaving adequate streamside vegetation to provide shading for Jackson Creek would reduce temperature increases to normal levels.

b. Recreation - Cumulatively, all alternatives except E and I would reduce the amount of area providing Semi-Primitive recreation opportunities and increase the amount of area providing Roaded Modified recreation opportunities. Alternatives E and I would require new trail construction to provide access within the area.

c. Wilderness - Alternatives E and I would maintain the option of future consideration of the area for Wilderness through 2030.

The remaining alternatives would reduce the amount of area available for wilderness consideration in the year 2000. Cumulatively, the most reduction would occur in Alternative H followed by B, D and F, A and C, G and G (Departure). These alternatives would remove the area from future consideration as wilderness by 2030.

d. Wildlife and Ecological - All alternatives except E and I would modify deer winter range cover. Cumulatively, modifications would be greatest under Alternative F followed by D, H, B, C, A, G and G (Departure). Timber harvest in all alternatives except D and F would be designed to perpetuate or improve winter range habitat values. Alternatives D and F would not emphasize deer habitat and would most likely decrease winter range habitat values.

All alternatives except E and I would likely reduce the amount of mixed conifer old growth habitat. Cumulatively, the most reduction would occur under Alternative D followed by A, F, B, G and G (Departure), H and C.

All alternatives except E and I would reduce the snag habitat for cavity dwelling wildlife. Cumulatively, the most reduction would occur under Alternative D followed by F, A, H, B, G and G (Departure).

Forest-wide standards and guidelines would adequately protect blue grouse wintering ridges and key habitats of other wildlife under all alternatives.

e. Range - All alternatives would maintain or increase current grazing levels. Alternatives D and F would increase grazing levels because of timber harvest entries through the year 2000. All alternatives except E and I would increase transitory range because of timber regeneration activities.

Cumulatively, Alternatives B and D would increase transitory range the most.

Alternatives D and F would create the largest acreage of disturbed soils and the greatest potential for noxious weed establishment.

f. Vegetation and Timber - Under all alternatives, mixed conifer stands would continue to be the principal forest vegetation.

Alternatives E and I would not permit timber harvest. These alternatives would retain the greatest inventory of salable wood volume and the greatest timber volume growth in the year 2000. Overall health and vigor of stands would decrease.

The overall health and vigor of timber stands would increase under all alternatives which permit timber management. The greatest increase in overall health would occur under Alternative H.

Under alternatives which would permit timber management, Alternative H would result in the largest number of acres regenerated and replaced with seedlings and saplings by the year 2000. Alternatives G, G (Departure) and A would result in the least acres regenerated to seedlings and saplings.

Alternative H would retain the smallest inventory of salable volume and the least timber volume growth in the year 2000. The lower volume growth would occur because seedlings and saplings would not yet be large enough to produce merchantable volume.

Timber volume losses caused by animal damage would increase in proportion to the acres of mature timber stands regenerated to seedlings and saplings.

g. Mineral and Energy - All alternatives except E and I would increase accessibility to known mineralized areas. Cumulatively, Alternatives D and F would provide the most increase. Alternatives E and I would maintain the lack of road access.

h. Fire - The fire suppression strategy for the area would not change under any alternative. All wildfires would be controlled to minimize the threat of a wildfire escaping into Canada or adjacent areas of high resource value.

All alternatives except E and I would increase the fire hazard in the short-term because of timber harvest activities. Cumulatively, timber management, including the use of prescribed fire, would increase vegetative diversity and reduce overall fire hazard by treating natural fuels. The risk of human-caused fire would increase under all alternatives, except E and I, because of increased access.

i. Insects and Disease - All alternatives except E and I would reduce the probability of serious insect and disease outbreaks because timber stands would be managed.

Alternatives E and I would not manage the timber stands in the area. This would result in endemic insect and disease outbreaks and volume and growth loss. The magnitude of these outbreaks is not known. There would be no known risk to timber stands in adjacent roaded areas.

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BODIE MOUNTAIN - 6002
6,044 Acres

1. History

For this cycle of planning, the Okanogan National Forest is the lead planning forest for this Roadless Area.

The area was originally inventoried as roadless during RARE II. The RARE II process allocated the area to non-wilderness management. The Curlew Ranger District (Colville National Forest) Multiple-Use Plan allocated the suitable timber portion of the area to Timber/Range Management and the unsuitable timber portion to Range Management. Since 1979, approximately 300 acres have been impacted by roads and logging.

2. Description (Existing Conditions)

a. Location and Access - The area is located northeast of Tonasket in the northeast and northwest portions of Okanogan and Colville National Forests respectively. Okanogan National Forest lands in Okanogan County make up approximately 3,680 acres and Colville National Forest lands in Ferry County make up the rest. From Tonasket, access is provided over State Highway 20 and County Road 9495.

b. Topography - Topography ranges from steep lower slopes along Toroda Creek to rounded rocky upper slopes and rolling broken ridgetops (all typical of the Okanogan Highlands Geologic Province). Elevations range from approximately 3,000 feet to over 4,500 feet.

c. Soils and Soil Types - Soils are derived primarily from glacial till. Areas of coarse textured soils may be intermixed with areas of fine textured lacustrine soils. These soils generally have high infiltration rates.

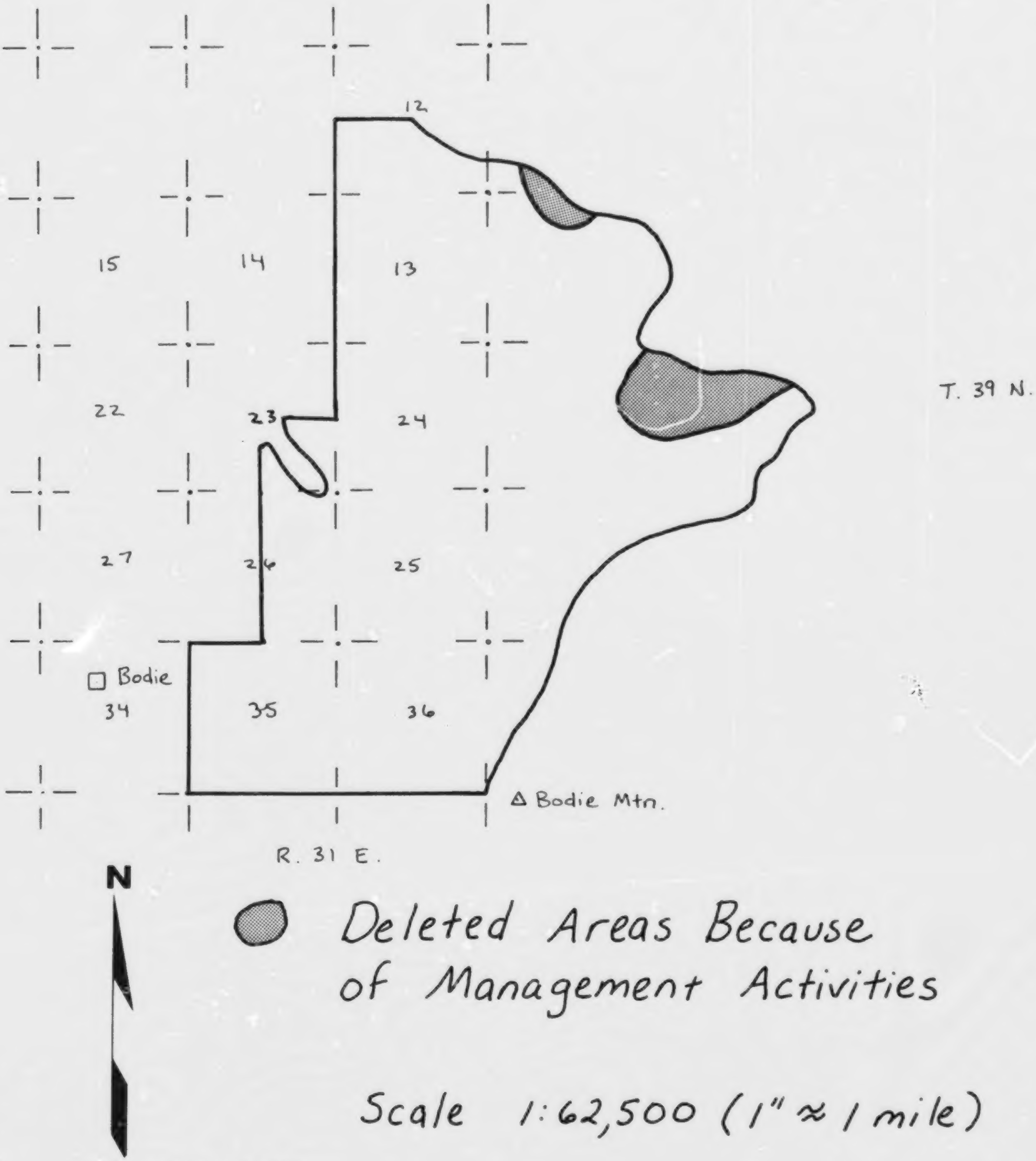
Coarse textured soils have low to moderate erosion hazards and are considered generally stable for management activities. Fine textured soils have a high mass erosion hazard when undercut.

d. Vegetation - Lower slopes and ridgetops are mostly covered with patchy groups of trees. Principal tree species are Douglas-fir and ponderosa pine. Lodgepole pine, western larch, subalpine fir and Engelmann spruce are also found. Slope shoulders are sparsely vegetated because of shallow soils and rock outcrops.

e. Ecosystem Types - The area is considered spruce-fir forest using Bailey's classification. Under Kuchler's classification, the area is mapped as Douglas-fir forest.

FIGURE C-2

BODIE MOUNTAIN ROADLESS AREA (6002)


12
15
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T. 39 N.
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□ Bodie
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36
Δ Bodie Mtn.
R. 31 E.
N
Deleted Areas Because of Management Activities
Scale 1:62,500 (1" ≈ 1 mile)

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3. Capability (Presence of Wilderness Characteristics)

a. Manageability and Boundaries - The small size of the area would make management as wilderness difficult. Placing boundaries on readily identified topographic features would eliminate any capability to manage the area as wilderness because the resulting area would be extremely small.

b. Natural Integrity, Appearance and Surroundings - The major impact on the natural integrity and appearance of the area are several short drift fences and an old road near the north boundary. Other than for vegetation, the characteristics of the area are not greatly different from surrounding areas.

c. Opportunities for Solitude, Primitive Recreation and Challenge - The area offers little opportunity for solitude and no opportunity for primitive recreation because farming activity and roads are visible from most locations within the area. Challenge is lacking except for the many rounded bluffs.

4. Availability (Other Resource Potentials and Management Considerations)

a. Recreation - The area provides Semi-Primitive, Non-Motorized recreation opportunities. There are no special recreation features available and the area does not lend itself to the establishment of developed sites. There are no system trails in the area. Current recreation use is low because of the lack of trails.

b. Wildlife - There are no known threatened, endangered or sensitive animals which appear on State, Federal or Forest Service lists. Almost 500 acres are identified as low density winter range, where both mule and white-tailed deer tend to concentrate. Here dense conifers, which provide protection from both deep snow and cold, and forage are vital to these herds. From 300 to 400 acres of mixed conifer old growth are estimated to exist, providing some of the most productive habitat types for wildlife. High snag numbers provide excellent habitat for many cavity dwelling animals. One ridge is identified as providing winter habitat for blue grouse. Numerous other wildlife common to the forest inhabit the area.

c. Water - The area contains several intermittent and perennial streams that drain directly into Toroda Creek. Toroda Creek is important to local residents for domestic, irrigation and stockwater use. Water quality is sufficient for all these uses. Harvey Creek and O'Conner Canyon Creek are considered to be perennial streams, but do not contribute significant water flows to Toroda Creek. Water from the area eventually drains into the Kettle River.

There are no power withdrawals, or known Federal Energy Regulatory Commission projects licensed or under consideration.

d. Range - The Okanogan National Forest portion of the area contains two cattle allotments (Toroda and Sheridan). The Toroda Allotment lies north of Harvey Creek and contains 9,207 acres of suitable grazing land on which 376 animal unit months are grazed. The Sheridan Allotment lies south of Harvey Creek and contains approximately 260 acres of National Forest and 310 acres of private lands which are unsuitable for grazing. Total acres of National Forest is 3,351. There are 321 animal unit months grazed. The Colville National Forest portion of the area contains a portion of the Tonata Cattle Allotment. All acres of this allotment are suitable to grazing.

e. Ecological - There are no known threatened, endangered or sensitive plants which appear on State, Federal or Forest Service lists.

f. Timber - The area contains approximately 1,000 acres of suitable forest land. The majority of these lands support mature mixed conifer stands. There is approximately 1.4 million cubic feet (6.9 million board feet) of standing merchantable volume. Potential timber yield is approximately .4 million cubic feet (1.8 million board feet) per decade.

There are no timber sales planned in the area through 1989 on the current Timber Sale Plan.

g. Minerals and Energy - Virtually all the area has high or medium-high potential for exploration and development of gold and silver deposits. Major targets are quartz-calcite veins and altered breccia zones in Tertiary volcanics. Approximately $500,000 was produced from similar deposits immediately south of the area. Twenty-four unpatented mining claims covering approximately 500 acres are known in the area, mainly in the northeast and southwest portions. No recent mining activity has occurred. The historic Sheridan Mining District is about six miles south of the area.

The area is considered to have low potential for leasable minerals (i.e. oil and gas, geothermal). No leases or lease applications are present.

h. Cultural - The Cultural Resource Overview of the Tonasket Planning Unit (Uebelacker 1978) identified no evidence of cultural resources in the area.

i. Land Use - There are no authorized land uses in the area.

j. Fire - The area experienced 3 lightning and no human-caused fires for the period 1970-1979. This area lies adjacent to private land, where there is a high risk from human-caused fires, which is cooperatively protected by the Washington State Department of Natural Resources and the Forest Service under a reciprocal fire agreement.

The current fire suppression strategy is to control all wildfires based on the area's proximity to private land and adjacent commercial forest land (USDA 1983). Due to the area's small size, confinement is not a viable strategy.

Application and use of unplanned ignitions (re. lightning and human-caused) to accomplish other resource objectives is not permitted under the current management direction.

k. Insects and Disease - During the past 5 years, very little insect activity was observed during annual surveys. Dwarf mistletoes are common in Douglas-fir stands. The nature and extent of root rot diseases is not known.

l. Private Lands - There is no private land within the area and no known outstanding subsurface rights.

5. Need

a. Nearby Wilderness Areas - The area is approximately 80 air miles west of the Salmo-Priest Wilderness on the Colville National Forest, approximately 50 air miles east of the Pasayten Wilderness and approximately 100 air miles northeast of the Lake Chelan-Sawtooth Wilderness.

b. Distance From Major Population Centers - The area is approximately 190 air miles northeast of Seattle and approximately 115 air miles northwest of Spokane.

c. Need for Ecosystem Representation - There are no unique ecosystems represented in the area. Ecosystems present are common throughout the area.

d. Proponent Interest, Public Input and Involvement - During the RARE II process, over 3,000 people expressed their preference for allocation of this area. Of these, 3 percent preferred wilderness with or without boundary adjustments, 2 percent preferred further planning with or without boundary adjustments and 95 percent preferred non-wilderness.

Approximately 750 people provided comments to the 1982 Draft Environmental Impact Statement for the Okanogan National Forest Plan. Of these, one percent expressed a preference that this area be allocated to wilderness.

The area was considered for wilderness designation during discussion of the 1984 Washington Wilderness Bill but was not designated.

6. Environmental Consequences

The following table shows the disposition of the area by management area by alternative.

TABLE C-5 Bodie Mountain Acres by Management Area by Alternative

Mgt.	Alternative									
Area	A(Current Dir)	B	C	D	E	F	G	G(DEP)	H	I
	thousand acres									
1	6.0	5.4	-	6.0	-	6.0	5.4	5.4	-	-
4	-	-	-	-	6.0	-	-	-	-	-
9	-	-	.3	-	-	-	-	-	.6	-
4	-	.6	5.7	-	-	-	.6	.6	5.4	6.0
Total	6.0									

a. Soils and Water - The relative rating of soil and water impacts is shown in the following table.

TABLE C-6 Bodie Mountain Soil and Water Impacts

Alt.	Riparian Areas (0-5 rating)	Mgt. Areas (0-10 rating)	Timber & Roads 0-13 rating)	Total
A	2	8	0	15
B	3	8	0	21
C	2	8	0	14
D	5	10	0	28
E	1	1	0	2
F	3	8	0	20
G	3	8	0	17
G(Depart)	3	8	0	17
H	3	8	0	18
I	3	8	0	4

There would be no impact on soil and water resources under any alternative.

b. Recreation - Cumulatively, all alternatives except E would reduce the amount of area providing Semi-Primitive recreation opportunities and increase the amount of area providing Roaded Modified recreation opportunities. Alternative E would require new trail construction to provide access within the area.

c. Wilderness - Alternative E would maintain the option of future consideration of the area for Wilderness through 2030.

The remaining alternatives would remove the area from future consideration as Wilderness by 2010.

d. Wildlife and Ecological - All alternatives except E and I would modify deer range cover. Modifications would be greatest under Alternatives D and F followed by A, B, G, G (Departure), H and C. Timber harvest in all alternatives except A, D and F would be designed to perpetuate or improve winter range habitat values.

Alternatives A, D and F would not emphasize deer habitat and would most likely decrease winter range habitat values.

All alternatives except E and I would likely reduce the amount of mixed conifer old growth habitat. The most reduction would occur under Alternative D followed by A, B, F, G, G (Departure), H and C.

All alternatives except E and I would reduce the snag habitat for cavity dwelling wildlife. The most reduction would occur under Alternative B followed by D, F, H, A, G, G (Departure) and C.

Forest-wide standards and guidelines would adequately protect blue grouse wintering ridges and key habitats of other wildlife under all alternatives.

e. Range - All alternatives would maintain or increase current grazing levels. Alternatives D and F would increase grazing levels because of timber harvest entries through the year 2000. All alternatives except E and I would increase transitory range because of timber regeneration activities. Cumulatively, alternatives B and D would increase transitory range the most.

f. Vegetation and Timber - Very little timber harvest would occur under any alternative by the year 2000. The structure and age of existing timber stands would remain unchanged. Timber volume losses caused by animal damage would be small in all alternatives.

g. Minerals and Energy - All alternatives except E would increase accessibility to lands having high potential for gold and silver deposits. Cumulatively, Alternatives A, D and F would provide the most increase. Alternative E would maintain the lack of road access.

h. Fire - The fire suppression strategy for the area would not change under any alternative. All wildfires would be con-

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trolled to protect adjacent private land and adjacent areas of high resource value.

All alternatives except E and I would increase the fire hazard in the short-term because of timber management activities. Cumulatively, timber management, which includes the use of prescribed fire, would increase vegetative diversity and reduce fire hazard by treating natural fuels. The risk of human-caused fire would increase under all alternatives, except E and I, because of increased access.

i. Insects and Disease - All alternatives except E would reduce the probability of serious insect and disease outbreaks because timber stands would be managed.

Alternative E would not manage the timber stands in the area. This would result in endemic insect and disease outbreaks. The magnitude of these outbreaks is not known. There would be no known risk to timber stands in adjacent roaded areas.

CLACKAMAS MOUNTAIN - 6003

15,125 Acres

1. History

For this cycle of planning, the Okanogan National Forest is the lead planning forest for this Roadless Area.

The Clackamas Mountain portion of the area was originally inventoried as roadless during RARE I. The Granite Creek portion was identified following RARE I. During the 1979 RARE II process the two areas were combined to form the Clackamas Mountain area. The RARE II process allocated the area to non-wilderness management. The 1979 Tonasket Unit Land Management Plan allocated approximately 8,500 acres to Wildlife Management and approximately 6,500 acres to Timber/Forage Management.

2. Description (Existing Conditions)

a. Location and Access - The area is located east of Tonasket in the east central and west central portions of the Okanogan and Colville National Forests respectively. Okanogan National Forest lands in Okanogan County make up approximately 14,600 acres and Colville National Forest lands in Ferry County make up the rest. From Tonasket, access is provided over State Highway 20 and County Road 9495.

b. Topography - Topography in the area is generally rugged. Ridgetops have gentle to moderate slopes, but drop off into the drainages with steep bluffs. Topography is broken, with a mimimum of consistent continuous slopes. One portion of the southeast corner of the area has very gentle topography. Elevations range from 3,000 feet in West Fork Granite Creek to approximately 5,500 feet on top of Clackamas Mountain.

c. Soils and Soil Types - Soils are derived primarily from glacial till. Areas of coarse textured soils may be intermixed with areas of fine textured lacustrine soils. These soils generally have high infiltration rates.

Coarse textured soils have low to moderate erosion hazards and are considered generally stable for management activities. Fine textured soils have a high mass erosion hazard when undercut.

d. Vegetation - Trees cover approximately 80 percent of the area draining north. Approximately 50 percent of that portion of the area draining south is tree covered. Scattered trees occur on southern slopes. Principal tree species are Douglas-fir, western larch and Ponderosa Pine. Lodgepole pine, subalpine fir and Engelmann spruce are also found.

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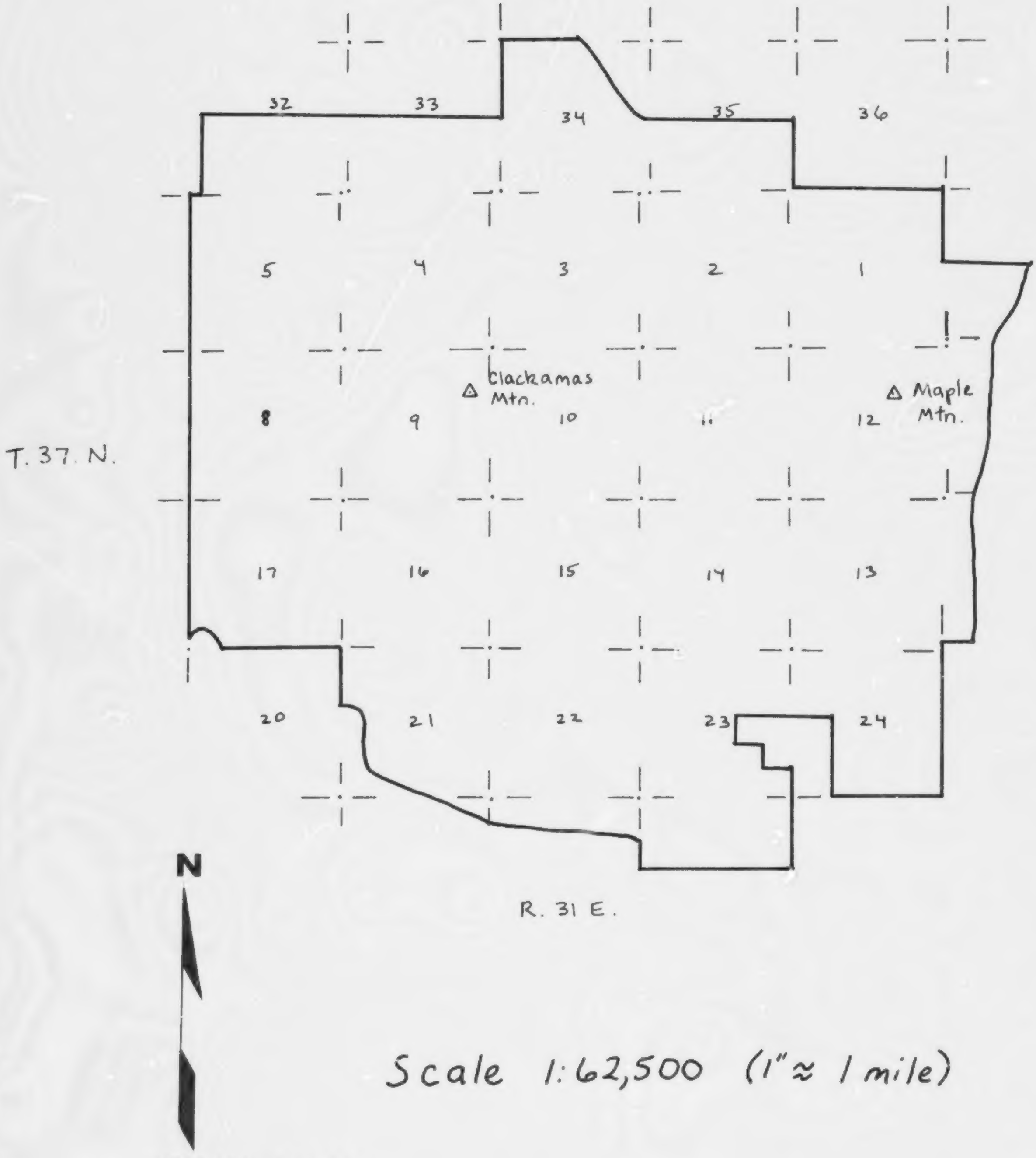
FIGURE C-3

CLACKAMAS ROADLESS AREA (6003)


32
33
34
35
36
5
4
3
2
1
Clackamas Mtn.
Maple Mtn.
8
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10
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T. 37. N.
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15
14
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20
21
22
23
24
N
R. 31 E.

Scale 1:62,500 (1"≈ 1 mile)

e. Ecosystem Types - The area is considered spruce-fir forest using Bailey's classification. Under Kuchler's classification, the area is mapped as Douglas-fir forest.

3. Capability (Presence of Wilderness Characteristics)

a. Manageability and Boundaries - The relatively small size of the area would make management as wilderness difficult. The most identifiable topographic feature is the ridge between Cougar Creek and Granite Creek. Placing boundaries here would reduce the size of the area by over 50 percent and further reduce the capability of managing it for wilderness.

b. Natural Integrity, Appearance and Surroundings - The major impact on the natural integrity and appearance of the area are the private lands and buildings and the number of range fences and water developments that exist. Although the rugged topography and bluffs provide scenic panoramas, the area is not greatly different from surrounding areas.

c. Opportunities for Solitude, Primitive Recreation and Challenge - The feeling of solitude and remoteness can be obtained because the broken topography of the area offsets its' size. Activity outside the area soon becomes unnoticed from interior valleys. The area offers no opportunity for primitive recreation because no portion is over three miles from a road. Moderate opportunities for challenge await the visitor.

4. Availability (Other Resource Potentials and Management Considerations)

a. Recreation - The western portion of the area provides Semi-Primitive, Non-Motorized recreation opportunities with most of the eastern portion providing Roaded Natural recreation opportunities. There are no special recreation features. The Sweat Creek Campground on the Tonasket-Republic Highway is the only developed site near the area. Use at this site has little impact on the interior of the area. The area does not lend itself to the development of additional sites. There are no system trails in the area. Recreation use within the area is limited mostly to the fall hunting season.

b. Wildlife - One State listed animal of special concern (*Strix nebulosa* - great gray owl) is reported to occur here (Washington State 1985). About 3,000 acres are in winter range (1/2 being high density), where both mule and white-tailed deer tend to concentrate. Here dense conifers, which provide protection from both deep snow and cold, and forage are vital to these herds. Approximately 2,800 acres of mixed conifer old growth has been field verified, providing some of the most productive habitat types for wildlife. High snag numbers provide excellent habitat for many cavity dwelling animals. At least three ridges provide winter habitat for blue grouse. Numerous other wildlife common to the two National Forests inhabit the area.

c. Water - The area is drained by Cougar Creek, Sweat Creek and Maple Creek. These streams are generally intermittent. Cougar Creek is one of the headwaters of Toroda Creek and a tributary of the Kettle River. Sweat Creek and Cougar Creek drain into Granite Creek, which is a tributary of the San Poil River which drains into the Columbia River.

Water yields from the area are low. It does not contribute significant amounts of stream flow to the major drainages in the area.

There are no existing power withdrawals, proposed impoundments or known Federal Energy Regulatory Commission permits or licenses outstanding.

d. Range - The area includes all but 80 acres of the Wauconda Cattle Allotment on the Okanogan National Forest. A small portion of the Trout Creek Cattle Allotment on the Colville National Forest is within the area. Of the approximately 13,700 acres in the Wauconda Allotment about 12,300 acres are suitable and 1,400 acres are unsuitable for grazing. The allotment is grazed under a two-unit deferred rotation management system with only natural barriers separating the two units. There are 1,336 animal unit months of grazing use here. The entire portion of the Trout Creek Allotment is unsuited for grazing due to steepness and dense timber.

e. Ecological - Three State and Forest Service listed sensitive plants (Listera borealis - northern twayblade, Vaccinium myrtilloides - blueberry and Mimulus washingtonensis - Washington monkey-flower) are reported to occur in the area (Washington State 1985).

f. Timber - The area contains approximately 7,800 acres of suitable forest land. The majority of these lands support mature mixed conifer stands. There is approximately 13.1 million cubic feet (64.8 million board feet) of standing merchantable volume. Potential timber yield is approximately 3.0 million cubic feet (14.9 million board feet) per decade.

There are no timber sales planned in the area during 1986 on the current Timber Sale Plan. A major portion of 1 sale with a volume of 9.0 million board feet is planned in 1989.

g. Minerals and Energy - This area has received the attention of prospectors periodically since the late 1800's. In the early 1900's, several thousand feet of underground workings were driven at the Wauconda mine just east of the area. No production is known from the mine. The area was scrutinized

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again in the 1970's for uranium. Claims staked during that time have largely been abandoned. Grant (1982) indicated the area had low potential for locatable exploration and development activities. However, 92 mining claims covering approximately 1,800 acres were staked in the northeast and southern portions of the area in 1984.

The area is considered to have low potential for leasable minerals. No leases or lease applications are present.

h. Cultural - The Cultural Resource Overview of the Tonasket Planning Unit (Uebelacker 1978) identified evidence of a couple of sheep camps in the area. In addition, evidence of a stock driveway and the Clackamas Indian Trail remain. The Clackamas Trail was used in the early 1900's as access from Granite Creek to Cougar Creek.

i. Land Use - There are no authorized land uses in the area.

j. Fire - The area experienced 5 lightning and 1 human-caused fire for the period 1970-1979. This area is roughly divided into two different fire created ecosystems. The western portion of the area is characterized as a grass fuel type dominated by ponderosa pine while the eastern portion is more representative of a Douglas-fir type with the fire carrier being needles, litter and branchwood deposited on the forest floor.

This area and adjacent private land is cooperatively protected by the Washington State Department of Natural Resources and the Forest Service, under a reciprocal fire agreement. The greatest risk of a wildfire affecting this area is from the spread of fires that originate on private land.

The current fire suppression strategy is to control all wildfires to protect the commercial forest land found within and adjacent to the area and the private property adjacent to area (USDA 1983).

Application and use of unplanned ignitions (re. lightning and human-caused) to accomplish other resource objectives is not permitted under the current management direction.

k. Insects and Disease - During the past 5 years, sporadic mortality as the result of the mountain pine beetle was observed in both lodgepole pine and ponderosa pine during annual surveys. Dwarf mistletoes are common in Douglas-fir stands. The nature and extent of root rot diseases is not known.

l. Private Lands - There are approximately 57 acres of private land accessible by primitive road within the area.

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5. Need

a. Nearby Wilderness Areas - The area is approximately 90 air miles west of the Salmo-Priest Wilderness on the Colville National Forest, approximately 60 air miles east of the Pasayten Wilderness and approximately 85 air miles northeast of the Lake Chelan-Sawtooth Wilderness.

b. Distance From Major Population Centers - The area is approximately 185 air miles northeast of Seattle and approximately 100 air miles northwest of Spokane.

c. Need for Ecosystem Representation - Approximately 1,400 acres were proposed as the Maple Mountain RNA in 1979. The proposed RNA contains examples of at least seven ecological cells listed in "Research Natural Area Needs in the Pacific Northwest" (Dryness and others 1975). These cells are not adequately represented within established RNA's in the Okanogan Highlands Physiographic Province. There are no other areas suitable for RNA status on the National Forest with representatives of these cells. In addition, the endemic plant *Talinum okanoganense* is found.

d. Proponent Interest, Public Input and Involvement - During the RARE II process, over 4,400 people expressed their preference for allocation of this area. Of these, 15 percent preferred wilderness with or without boundary adjustments, 20 percent preferred further planning with or without boundary adjustments and 65 percent preferred non-wilderness.

Over 200 people provided comments to the 1978 Draft Environmental Impact Statement for the Tonasket Unit Land Management Plan. Seventeen people expressed a preference for allocation of this area. Of these, 11 preferred wilderness and 6 preferred further planning.

Approximately 750 people provided comments to the 1982 Draft Environmental Impact Statement for the Okanogan National Forest Plan. Of these, 39 percent expressed a preference that this area be allocated to wilderness.

The area was considered for wilderness designation during discussion of the 1984 Washington Wilderness Bill but was not designated.

6. Environmental Consequences

The following table shows the disposition of the area by management area by alternative.

TABLE C-7 Clackamas Mountain Acres by Management Area by Alternative

Mgt. Area	A(Current Dir)	B	C	D	E	F	G	G(DEP)	H	I
					thousand acres					
1	9.8	9.1	-	12.1	-	15.1	11.1	11.1	-	-
4	-	-	-	-	15.1	-	-	-	-	9.4
5	-	1.5	1.6	3.0	-	-	-	-	-	-
8	-	1.4	1.4	-	-	-	1.4	1.4	1.4	1.4
9	7.7	1.3	1.6	-	-	-	2.0	1.2	3.7	1.0
14	-	1.8	10.5	-	-	-	1.3	1.4	10.0	3.3
Total	15.1									

a. Soils and Water - The relative rating of soil and water impacts is shown in the following table.

TABLE C-8 Clackamas Mountain Soil and Water Impacts

Alt.	Riparian Areas (0-5 rating)	Mgt. Areas (0-10 rating)	Timber & Roads 0-13 rating)	Total
A	2	5	1	8
B	3	6	2	11
C	2	6	2	10
D	5	7	2	14
E	1	1	0	2
F	3	8	2	13
G	3	7	1	11
G(Depart)	3	7	1	11
H	3	7	1	11
I	3	1	0	4

Cumulatively, Alternatives D and F would have the most impact on soil and water resources in the area; followed by B, H, G and G (Departure), A and C. Alternatives I and E would have no impact on the soil and water resources.

Soil compaction would increase slightly in Alternatives D and F because the land use designation (management areas) would result in the greatest number of acres of roads and timber harvest. The other alternatives would not increase soil compaction. Increased soil compaction would reduce vegetative growth and establishment. This would reduce timber yields. Soil water infiltration rates would be reduced and surface soil erosion would increase. Soil ripping of landings and heavily used skid trails after logging operations would reduce potential impacts. The probability of this practice working is very high because of the limited amount of compaction.

Stream sediment loads would increase the most in Alternatives D and F because of greater road construction and timber harvest. Alternatives E and I would have no effect on stream sedimentation because no roads would be constructed, and no timber would be harvested. The other alternatives would not result in major stream sedimentation increases although there would be temporary sedimentation increases in small drainages as new roads were constructed. Stream sediment load increases would not reduce the water's utility for current uses.

Only Alternative D would have the possibility of increasing stream water temperature. Temperature increases would be slight to moderate. Constant water temperatures would not be detrimental to other resources. A slight increase in water temperature would be benefical to the fisheries resource. Higher water temperatures would not decrease the water's capability to be used in irrigation. Domestic water use may be slightly affected because some people have developed a taste for water at a specific temperature.

b. Recreation - Cumulatively, all alternatives except E and I would reduce the amount of area providing Semi-Primitive recreation opportunities and increase the amount of area providing Roaded Natural and Roaded Modified recreation opportunities. Alternatives E and I would require new trail construction to provide access within the area.

Alternatives B, C and D would provide Roaded Natural recreation opportunities on those portions of the area viewed from Highway 20. Alternatives A, F, G, G (Departure) and H would provide Roaded Modified recreation opportunities.

c. Wilderness - Alternatives E and I would maintain the option of future consideration of the area for wilderness through 2030.

The remaining alternatives would reduce the amount of area available for wilderness consideration in the year 2000. Cumulatively, the most reduction would occur in Alternatives B and D followed by F, C, A and H, G and G (Departure). These alternatives would remove the area from future consideration as wilderness by 2030.

d. Wildlife and Ecological - All alternatives except E, F and I would modify deer range cover. Modifications would be greatest under Alternative D followed by A, B, C, H, G, G (Departure). Timber harvest in all alternatives except D would be designed to perpetuate or improve winter range habitat values.

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Alternative D would not emphasize deer habitat and would most likely decrease winter range habitat values.

All alternatives except E, F and I would likely reduce the snag habitat for cavity dwelling wildlife. The most reduction would occur under Alternative D followed by B, A, C, G, G (Departure) and H.

Forest-wide standards and guidelines would adequately protect blue grouse wintering ridges and key habitats of other wildlife under all alternatives.

No effect on sensitive plant species would be expected under any alternative.

e. Range - All alternatives would maintain or increase current grazing levels except Alternatives G and G Departure. Alternatives B and D would provide the greatest increase followed by C and F. Alternative H would show no change. Noxious weeds would have the greatest opportunity to spread under Alternatives B and D.

f. Vegetation and Timber - Under all alternatives, mixed conifer stands would continue to be the principal forest vegetation.

Alternatives E and I would not permit timber harvest. These alternatives would retain the greatest inventory of salable volume and the greatest timber volume growth in the year 2000. Overall health and vigor of stands would decrease.

The overall health and vigor of timber stands would increase under all alternatives which permit timber management. The greatest increase in overall health would occur under Alternatives B and D.

Under alternatives which permit timber management, Alternatives B and D would result in the largest number of acres regenerated and replaced with seedlings and saplings by the year 2000. Alternatives G and G (Departure) would result in the least acres regenerated to seedlings and saplings.

Alternatives B and D would retain the smallest inventory of salable volume and the least timber volume growth in the year 2000. The lower volume growth would occur because seedlings and saplings would not yet be large enough to produce merchantable volume.

Timber volume losses caused by animal damage would increase in proportion to the acres of mature timber stands regenerated to seedlings and saplings.

g. Minerals and Energy - All alternatives except C, E, H and I would increase accessibility for minerals. Alternative F would provide the most access; followed by D, G, B and A. Alternative E would maintain the lack of road access.

h. Fire -The fire suppression strategy for the area would not change under any alternative. All wildfires would be controlled to minimize the threat of a wildfire escaping onto private land and adjacent land of high resource value. The protection of old growth and key deer winter range from destructive high intensity fires would be a primary suppression and fuel treatment objective within the area.

All alternatives except E and I would increase the fire hazard in the short-term from timber harvest activities. Cumulatively, timber management, including the use of prescribed fire, would increase vegetative diversity and reduce overall fire hazard by treating natural fuels. The risk of human-caused fire would increase under all alternatives, except E and I, because of increased access.

i. Insects and Disease - All alternatives except E and I would reduce the probability of serious insect and disease outbreaks because timber stands would be managed.

Alternatives E and I would not manage the timber stands in the area. Tree mortality caused by mountain pine beetle would likely increase. Adjacent stands of lodgepole pine and immature ponderosa pine in roaded areas would likely be at risk if mountain pine beetle populations expand. Volume at risk is not known, but would probably be large.

Endemic disease outbreaks would result in confined loss of volume growth. Risk to adjacent roaded areas would probably be low.

HUNGRY RIDGE - 6015

12,451 Acres

1. History

The area was originally inventoried as roadless (14,500 acres) during RARE I. Between 1972 and 1979, timber sales and roads along with new roadless area inventory criteria reduced the size of the area by approximately 500 acres. The 1979 RARE II process allocated the area to non-wilderness management. The 1969 Twisp Ranger District Multiple-Use Plan allocated most of the area to Timber/Forest Management. Since 1979, approximately 1,600 acres have been impacted by roads and logging.

2. Description (Existing Conditions)

a. Location and Access - The area is located south of Twisp in the south portion of the Okanogan National Forest. All lands are in Okanogan County. From Twisp, access is provided over State Highway 153 and County and National Forest Roads in South Fork Gold Creek, McFarland Creek, Squaw Creek and Black Canyon.

b. Topography - This area exhibits rolling topography etched by stream and glacial action. Most streams flow northeast toward the Methow River. Elevations range from 2,200 feet just above Squaw Creek to over 6,200 feet on Fox Peak.

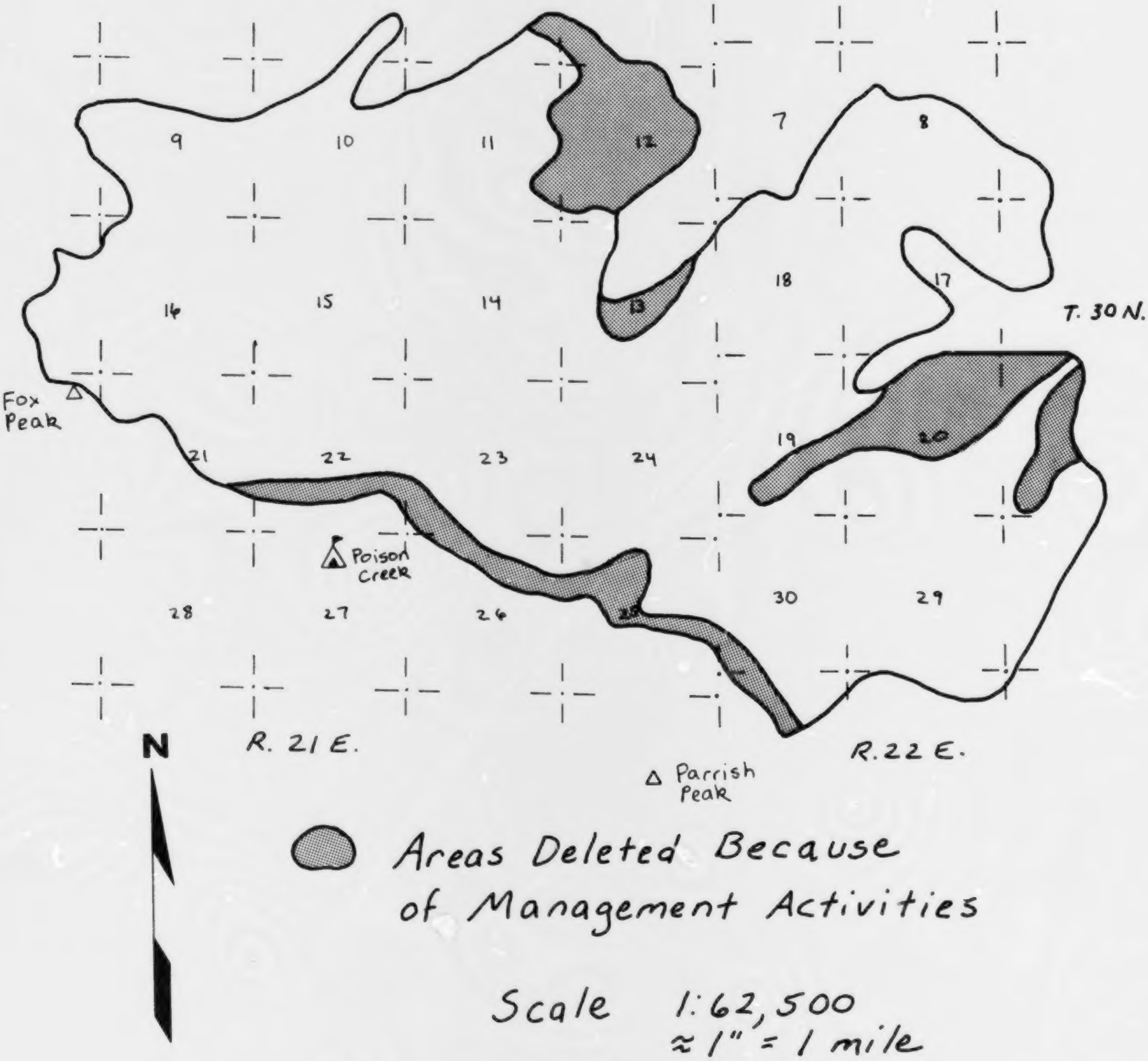
c. Soils and Soil Types - Soils are derived primarily from granitic glacial till. Some soils are covered with varying thicknesses of volcanic ash and pumice. Soil depths vary from less than 6 inches to over 60 inches. These soils generally have high infiltration rates.

Soils have low to moderate erosion hazards and are considered generally stable for management activities. High mass stability hazards occur in avalanche and debris avalanche chutes.

d. Vegetation - Most of the area lies in two life zones. The Pine Forest Zone occurs at lower elevations with the Mountain Forest Zone above it. Scattered trees over shrubs and grasses occupy the drier southern slopes. Trees grow on northern slopes with shrubs occupying wetter sites. Closed canopied lodgepole pine and ponderosa pine originating from the 1929 Camas Fire covers most of the higher elevations. Principal tree species are Douglas-fir, ponderosa pine and lodgepole pine. Subalpine fir and Engelmann spruce are also found.

FIGURE C-4

HUNGRY RIDGE ROADLESS AREA (6015)


9
10
11
12
7
8
16
15
14
13
18
17
T. 30 N.
Fox Peak
21
22
23
24
19
20
Poison Creek
28
27
26
25
30
29
N
R. 21 E.
R. 22 E.
Parrish Peak

▨ Areas Deleted Because of Management Activities

Scale 1:62,500
≈ 1" = 1 mile

e. Ecosystem Types - The area is considered spruce-fir forest using Bailey's classification. Under Kuchler's classification, the area is mapped as Douglas-fir forest.

3. Capability (Presence of Wilderness Characteristics)

a. Manageability and Boundaries - The relatively small size of the area would make management as wilderness difficult. Placing bounddaries on readily identified features would greatly reduce the size of the area and further reduce its' capability for management as wilderness.

b. Natural Integrity, Appearance and Surroundings - While entirely surrounded by roads, the interior of the area shows few signs of human activity. A fireline was constructed across the southeast corner of the area in 1970 and remains very visible. Vegetation and topography are similar to the surrounding area.

c. Opportunities for Solitude, Primitive Recreation and Challenge - There is little opportunity for solitude and no opportunity for primitive recreation because of the relatively small size of the area and the proximity of the area to roads. Few challenges exist.

4. Availability (Other Resource Potentials and Management Considerations)

a. Recreation - The central portion of the area provides Semi-Primitive, Non-Motorized recreation opportunities while those portions of the area adjacent to roads generally provide Roaded Natural recreation opportunities. A small portion of the area provides Roaded Modified opportunities. There are no special recreation features and the area does not lend itself to the establishment of developed sites. Two system trails provide access through the area. Recreation use area is low due to limited attractions. Dense lodgepole pine stands make cross-country travel unattractive. Hunting is the primary recreation use.

b. Wildlife - A Federal and State listed threatened animal (Ursus arctos - grizzly bear) has been reported to occur in or near the area (Washington State 1985). There have been no recent confirmed sightings. From 300 to 400 acres of mixed conifer old growth are estimated to exist, providing some of the most productive habitat types for wildlife. Snag numbers for cavity dwellers are generally high. Numerous other wildlife common to the forest inhabit the area.

c. Water - The major stream draining the area is Gold Creek. Water is used for irrigation. Some limited domestic use occurs on private land below the area. These systems essentially have no treatment before use. Water quality is very high. There is limited mining exploration in St. Luise Creek at the head of South Fork Gold Creek. Water monitoring during 1981 showed no off-site impacts from mining. There was some channel degradation where the actual exploration occurred.

There are no known power withdrawals or Federal Energy Regulatory Commission permits or licenses in force.

d. Range - This area includes portions of the Rainy Creek, McFarland and Squaw Creek Units of the Hunter-McFarland Cattle Allotment. There are 16,900 acres of suitable grazing land within these units and approximately 50 percent are within this area. The units are managed under a deferred rotation grazing system with alternate year use dates varying. There are approximately 600 animal unit months of grazing in the portion of this allotment in the area.

e. Ecological - There are no known occurrences of endangered, threatened or sensitive plants which appear on State, Federal or Forest Service lists.

f. Timber - The area contains approximately 8,900 acres of suitable forest land. The timber stands are composed of mature mixed conifer and lodgepole pine. There is approximately 12.7 million cubic feet (62.9 million board feet) of standing merchantable volume. Potential timber yield is approximately 2.9 million cubic feet (14.4 million board feet) per decade.

There are no timber sales planned in the area during 1986 on the current Timber Sale Plan. A portion of 1 sale with a volume of .5 million board feet is planned in 1987.

g. Minerals and Energy - This area includes approximately 1,400 acres of land having high potential for locatable mineral exploration and development. Possible targets include high grade silver veins and a large, low grade lead-zinc-silver deposit in upper Saint Luise Creek; and narrow gold-silver-tungsten bearing veins in the Squaw Creek Basin. The Saint Luise Creek prospect is a relatively new discovery while the Squaw Creek/Hunter Mountain district has been active on and off since the late 1800's. Several mines and prospects located a few miles east of the area have produced significant amounts of gold, silver, copper and tungsten ore. The remaining portion of the area offers medium-low probability for uranium exploration and development.

Potential for the discovery of oil and gas, geothermal resources, and other leasable minerals is considered low. No leases or lease applications are recorded in the area.

h. Cultural - The Cultural Resource Overview of the Twisp-Winthrop-Conconully Planning Unit (Bennett 1979) identified no evidence of cultural resources in the area.

i. Land Use - There are no authorized land uses in the area.

j. Fire - The area has experienced 7 lightning and no human-caused fires for the period 1970-1979. The current vegetative types found within the area are representative of the closed canopied lodgepole and ponderosa pine fire ecosystems created during the 1920's. The overall large fire potential has been reduced due to these past fires which has consumed the majority of natural fuels within the area. Maintenance of this type of fire environment requires periodic occurrence of low intensity fires to pass through the area thereby limiting unnatural fuel buildups that leads to the ultimate destruction of the stand. This is not the case for the lodgepole pine which is very fire intolerant and easily killed by wildfires of any intensity.

The main fire risk within the area is from lightning fires, which occur with great regularity.

The current fire suppression strategy is to control all wildfires to protect commercial forest within and adjacent to the area and to reduce the potential of a large fire from occurring on the much more flammable south slope communities of the Wenatchee National Forest which border Lake Chelan (USDA 1983).

Application and use of unplanned ignitions (re. lightning and human-caused) to accomplish other resource objectives is not permitted under the current management direction.

k. Insects and Disease - During the past 5 years, very little insect activity was observed during annual surveys. Dwarf mistletoes are common in Douglas-fir stands and may also be found in lodgepole pine. The nature and extent of root rot diseases is not known.

l. Private Lands - There is no private land within the area and no known outstanding subsurface rights.

5. Need

a. Nearby Wilderness Areas - The area is approximately 50 air miles south of the Pasayten Wilderness, approximately 10 air miles southeast of the Lake Chelan-Sawtooth Wilderness and approximately 20 air miles southeast of the Glacier Peak Wilderness on the Wenatchee National Forest.

b. Distance From Major Population Centers - The area is approximately 115 air miles northeast of Seattle and approximately 125 air miles northwest of Spokane.

c. Need for Ecosystem Representation - There are no unique ecosytems represented in the area. Ecosystems present are common throughout the area.

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d. Proponent Interest, Public Input and Involvement - During the RARE II process, over 1,600 people expressed their preference for allocation of this area. Of these, 4 percent preferred wilderness with or without boundary adjustments, 1 percent preferred further planning with or without boundary adjustments and 95 percent preferred non-wilderness.

Approximately 750 people provided comments to the 1982 Draft Environmental Impact Statement for the Okanogan National Forest Plan. No preference was expressed for allocating this area to wilderness.

The area was considered for wilderness designation during discussion of the 1984 Washington Wilderness Bill but was not designated.

6. Environmental Consequences

The following table shows the disposition of the area by management area by alternative.

TABLE C-9 Hungry Ridge Acres by Management Area by Alternative

Mgt.	Alternative									
Area	A(Current Dir)	B	C	D	E	F	G	G(DEP)	H	I
	thousand acres									
1	11.5	12.5	-	12.5	-	12.5	12.5	12.5	-	-
2	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	12.5
4m	-	-	-	-	12.5	-	-	-	-	-
5	1.0	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-
14	-	-	12.5	-	-	-	-	-	12.5	-
Total	12.5 --									

a. Soils and Water - The relative rating of soil and water impacts is shown in the following table.

A4

TABLE C-10 Hungry Ridge Soil and Water Impacts

Alt.	Riparian Areas (0-5 rating)	Mgt. Areas (0-10 rating)	Timber & Roads (0-13 rating)	Total
A	2	8	1	11
B	3	8	2	13
C	2	8	2	12
D	5	10	2	17
E	1	3	0	4
F	3	8	2	13
G	3	8	2	13
G(Depart)	3	8	2	13
H	3	8	1	12
I	3	1	0	4

Cumulatively, Alternative D would have the most impact on soil and water resources in the area; followed by B, F, H, G and G (Departure), A and C.

Soil compaction would increase only slightly in Alternative D from timber harvest and the management area designation. The other alternatives would not noticeably increase soil compaction. Increased soil compaction would reduce vegetative growth and establishment. This would reduce timber yields. Soil water infiltration rates would be reduced and surface soil erosion could increase. Soil ripping of landings and heavily used skid trails after logging operations would reduce the potential impacts. The probability of this practice working is very high.

Cumulatively, stream sediment loads would increase the most in Alternative D because of the high levels of road construction and timber harvest. Alternatives E and I would have little to no effect on stream sedimentation loads because no roads would be constructed and no timber would be harvested. The other alternatives would not result in noticeable stream sedimentation load increases although there might be temporary sediment increases in small drainages when new roads were constructed. None of the alternatives would reduce the water's utility for current uses.

Only Alternative D would have the possibility of increasing stream water temperature. Temperature increases would be slight to moderate. Constant water temperatures would not be detrimental to other resources. A slight increase in water temperature would be benefical to the fisheries resource. Higher water temperatures would not decrease the water's capability to be used in irrigation. Domestic water use may be slightly affected because some people have developed a taste for water at a specific temperature.

b. Recreation - Cumulatively, all alternatives except E and I would reduce the amount of area providing Semi-Primitive recreation opportunities and increase the amount of area providing Roaded Modified recreation opportunities. Alternatives E and I would require new trail construction to provide access within the area.

c. Wilderness - Alternatives E and I would maintain the option of future consideration of the area for Wilderness through 2030.

The remaining alternatives would reduce the amount of area available for wilderness consideration in the year 2000. Cumulatively, the most reduction would occur in Alternatives D and F followed by B and C, G, G (Departure), H and A. These alternatives would remove the area from future consideration as wilderness by 2030.

d. Wildlife and Ecological - All alternatives except E and I would likely reduce the amount of mixed conifer old growth habitat. The most reduction would occur under Alternative A followed by D, F, B, G (Departure), G, C and H.

All alternatives except E and F would reduce the snag habitat for cavity dwelling wildlife. The most reduction would occur under Alternative D followed by F, B, G (Departure), G, A, C and H.

Forest-wide standards and guidelines would adequately protect blue grouse wintering ridges and key habitats of other wildlife under all alternatives. No effect on threatened animal species would be expected under any alternative.

e. Range - All alternatives would increase grazing levels, with Alternative H resulting in only a slight increase and D and F nearly doubling. These alternatives would also create the most soil disturbance and thus the greatest potential for noxious weed invasion.

f. Vegetation and Timber - Under all alternatives, mixed conifer stands would continue to be the principal forest vegetation.

Alternatives E and I would not permit timber harvest. These alternatives would retain the greatest inventory of salable volume and the greatest timber volume growth in the year 2000. Overall health and vigor of stands would decrease.

The overall health and vigor of timber stands would increase under all alternatives which permit timber management. The greatest increase in overall health would occur under Alternatives D and F.

Under alternatives which permit timber management, Alternatives D and F would result in the largest number of acres regenerated and replaced with seedlings and saplings by the year 2000. Alternative A followed by H and G would result in the least acres regenerated to seedlings and saplings.

Alternatives D and F would retain the smallest inventory of salable volume and the least timber volume growth in the year 2000. The lower volume growth would occur because seedlings and saplings would not yet be large enough to produce merchantable volume.

Timber volume losses caused by animal damage would increase in proportion to the acres of mature timber stands regenerated to seedlings and saplings.

g. Minerals and Energy - All alternatives except E and I would increase accessibility for minerals. Alternatives A, B, F and G would provide approximately the same amount of increased access. Alternatives E and I would maintain the lack of road access.

h. Fire - The fire suppression strategy for the area would not change under any alternative. All wildfires would be controlled to minimize the threat of spreading onto the Wenatchee National Forest and into adjacent areas of high resource value.

All alternatives except E and I would increase fire hazard in the short-term from timber harvest activities. Cumulatively, timber management, including the use of prescribed fire, would reduce overall fire hazard by increasing vegetative diversity through creation of uneven aged mosaic stands. The use of prescribed fire and the resultant competition of brush should be a consideration in the application and use of prescribed fire. The risk of human-caused fire would increase under all alternatives, except Alternative E and I, because of increased access. Without prompt treatment of all activity slash, the risk of large fires from lightning would increase.

i. Insects and Disease - All alternatives except E and I would reduce the probability of serious insect and disease outbreaks because timber stands would be managed.

Alternatives E and I would not manage the timber stands in the area. Mature stands of lodgepole pine would remain at risk to mountain pine beetle outbreaks. Should beetle populations become established, stands of mature lodgepole pine and immature ponderosa pine in adjacent roaded areas would be susceptible. Potential volume losses are not known, but may be moderately high.

Endemic disease outbreaks would result in some volume and growth loss. The magnitude of loss is not known. Risk to stands in adjacent roaded areas would probably be low.

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BLACK CANYON - 6016

12,915 Acres

1. History

The area was originally inventoried as roadless during RARE I. The 1979 RARE II process allocated the area to non-wilderness management. The 1969 Twisp Ranger District Multiple Use Plan allocated most of the area to Timber/Forage Management except for a small portion in Black Canyon which was allocated to Wildlife Management and that portion seen from State Highway 153 which was allocated to Scenic Viewshed Management. Since 1979, approximately 700 acres have been impacted by roads and logging, mostly in the Timber/Forage Management allocation.

2. Description (Existing Conditions)

a. Location and Access - The area is located south of Twisp in the extreme southern portion of the Okanogan National Forest. All lands are in Okanogan County. From Twisp, access is provided over State Highway 153 and County and National Forest Roads in Black Canyon and Antoine Creek.

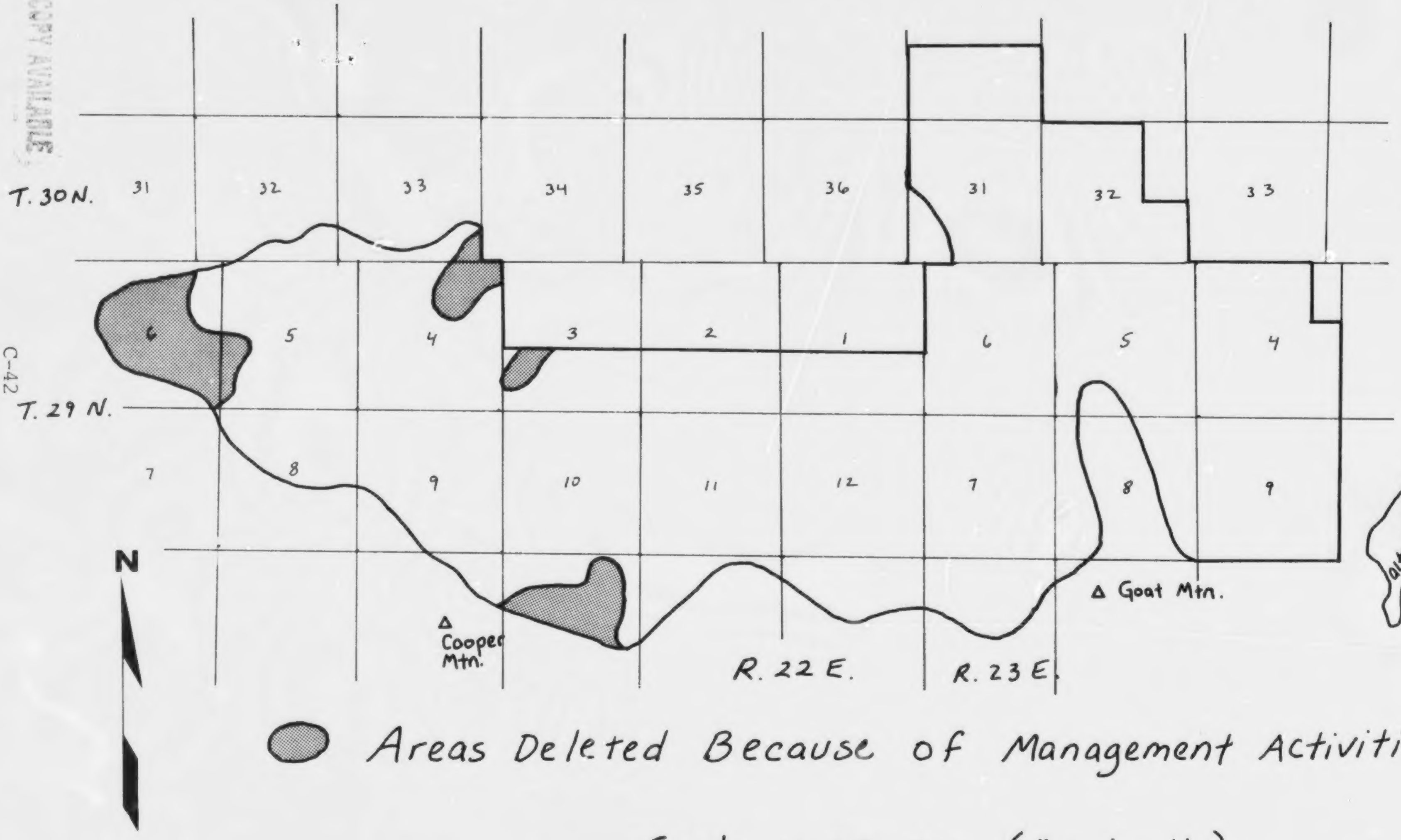
b. Topography - This area exhibits rolling topography etched by stream and glacial action. Most streams flow northeast toward the Methow River. Elevations range from 2,200 feet just above Squaw Creek to over 6,200 feet on Fox Peak.

c. Soils and Soil Types - Most of the soils are granitically derived tills over granitic bedrock. Some soils are covered with varying thicknesses of volcanic ash or pumice. Organic matter is limited to the upper 2-4 inches of the soil profile. These soils generally have high infiltration rates.

Soils covered by organic matter have low erosion hazards and are considered generally stable for management activities. Where the litter layer has been stripped away or where soils are very shallow, erosion hazards are high to very high and are considered unstable for management activities. Mass erosion hazard is low except in debris avalanche chutes.

d. Vegetation - Much of the area is covered with immature lodgepole pine which became established following the 1970 Mitchell Creek Fire. Larger trees cover the northern slopes. Principal tree species are lodgepole pine, Douglas-fir and ponderosa pine. Some subalpine fir and Engelmann spruce is also found. Ground cover includes shrubs on wetter sites and shrub and grass mixture on drier sites.

BLACK CANYON
ROADLESS AREA (6016)


T. 30 N.
31
32
33
34
35
36
31
32
33
6
5
4
3
2
1
6
5
4
T. 29 N.
7
8
9
10
11
12
7
8
9
Ute Lake
Goat Mtn.
Cooper Mtn.
R. 22 E.
R. 23 E.
N

▨ Areas Deleted Because of Management Activities

Scale 1:62,500 (1" ≈ 1 mile)

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FIGURE C-5

e. Ecosystem Types - The area is considered spruce-fir forest using Bailey's classification. Under Kuchler's classification approximately 20 percent of the area is mapped as western ponderosa pine forest with the remaining 80 percent mapped as Douglas-fir forest.

3. Capability (Presence of Wilderness Characteristics)

a. Manageability and Boundaries - The relatively small size of the area would make management as wilderness difficult. Most of the south boundary of the area is on an identifiable ridgetop. The most logical location for boundaries on the north end would be contour lines which would be difficult to identify and which would further reduce the capability of managing the area as wilderness.

b. Natural Integrity, Appearance and Surroundings - The major impact to the natural integrity and appearance of the area are several wide firelines which were built in 1970 as the result of the Mitchell Creek Fire. Although reseeded and supporting good stands of grass, the firelines will be very noticeable for years to come. Some vegetationm and topographic diversity exists, but is not greatly different from surrounding areas.

c. Opportunities for Solitude, Primitive Recreation and Challenge - The area provides limited opportunities for solitude, primitive recreation and challenge.

4. Availability (Other Resource Potentials and Management Considerations)

a. Recreation - Most of the area provides low quality Semi-Primitive, Non-Motorized recreation opportunities because of the influence of activities in the surrounding areas. Some Roaded Natural recreation opportunities are provided on those portions of the area adjacent to roads. There are no special recreation features and the area does not lend itself to the establishment of developed sites. There are no system trails in the area. Recreation use is low because of the lack of attractions and trails. Fall hunting is the primary use.

b. Wildlife - One State listed animal of special concern (*Sciurus griseus* - western gray squirrel) is reported to occur in the area (Washington State 1985). About 2,200 acres are in winter range (1/3 being high density), where both mule and white-tailed deer tend to concentrate. Here dense conifers, which provide protection from both deep snow and cold, and available forage are vital to these herds. From 100 to 200 acres of mixed conifer old growth are estimated to exist, providing some of the most productive habitat types for wildlife. Snag numbers for cavity dwellers are generally high. Numerous other wildlife common to the forest inhabit the area.

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c. Water - The major streams draining the area are Little Joe Creek and Black Canyon Creek. During normal or dry years, the streams flow no water during August and September. Black Canyon Creek is an over adjudicated stream. Junior water right holders have water supplies cut off during dry periods. Water is used for livestock and for limited domestic and irrigation purposes. Domestic water supplies are collected in shallow wells along the creeks.

Water quality is fair to good. Water temperatures raise during the summer because of the sluggish flow in the lower reaches of the streams.

Water yields from the area are relatively unimportant to the streamflow of any large streams or rivers.

There or no existing power withdrawals, proposed impoundments or known Federal Energy Regulatory Commission permits or licenses outstanding.

d. Range - The area is totally within the Black Canyon Unit of the Hunter-McFarland Cattle Allotment and covers approximately one-half of it. The allotment has very rugged terrain with slopes exceeding 50% on nearly half of it. Of the total 13,931 acres, 3,610 are classified unsuitable for cattle grazing. Wildfires in 1970 were responsible for making 4,259 acres suitable for grazing and is considered transitory range. Lack of range improvements and water distribution causes the stocking rate to drop from 2,236 AUM'S to 669 AUM'S. This unit is managed under an alternate year spring/fall rotation system.

e. Ecological - There are no known occurrences of endangered, threatened or sensitive plants which appear on State, Federal or Forest Service lists.

f. Timber - The area contains approximately 7,900 acres of suitable forest land. The majority of these lands support immature stands of lodgepole pine which became established following the 1970 Mitchell Creek Fire. Since 1980, several hundred acres have been precommercially thinned. The remaining suitable lands support mature mixed conifer and lodgepole stands. There is approximately 3.6 million cubic feet (18 million board feet) of standing merchantable volume. Potential timber yield is approximately 2.5 million cubic feet (12.2 million board feet) per decade.

There are no timber sales planned in the area during 1986 on the current Timber Sale Plan. A portion of 1 sale with a volume of .5 million board feet is planned in 1987.

g. Minerals and Energy - Potential for locatable mineral exploration and development in this area is considered to be medium-low on approximately 9,000 acres and low-unknown on the remining area. Anomolous uranium in stream sediments derived from granitic rocks of the Cooper Mountain Batholith suggests some energy potential. No prospects or mines are known in the area and no mining claims are present.

Leasable mineral potential is low and no leases or lease applications are recorded in the area.

h. Cultural - The Cultural Resource Overview of the Twisp-Winthrop-Conconully Planning Unit (Bennett 1979) identified no evidence of cultural resources in the area.

i. Land Use - There are no authorized land uses in the area.

j. Fire - The area has experienced 4 lightning and 1 human-caused fire for the period 1970-1979. The Mitchell Creek Fire of 1970 burned over approximately 50% of the area. The direct affect of this fire was to establish lodgepole pine as the principle conifereous species within the area. In addition, a large number of acres where naturally revegetated with brush species. This brush component is the primary fire carrier along with annual grass over most of the area. For that reason the overall fire potential remains low, except for the grass dominated ponderosa pine stands along the breaks of the Methow River.

The current fire suppression strategy is to control all wildfires to protect commercial forest land, found within and adjacent to the area, and to restrict fire spread onto the more flammable south slope communities of the Wenatchee National Forest bordering Lake Chelan (USDA 1983).

Application and use of unplanned ignitions (re. lightning and human-caused) to accomplish other resource objectives is not permitted under the current management direction.

k. Insects and Disease - During the past 5 years, sporadic mortality in the remaining mature lodgepole pine stands was observed during annual surveys. These stands are highly susceptible to mountain pine beetle. Dwarf mistletoes are common in Douglas-fir stands. The nature and extent of root rot diseases is not known.

l. Private Lands - There is no private land within the area and no known outstanding subsurface rights.

5. Need

a. Nearby Wilderness Areas - The area is approximately 55 air miles south of the Pasayten Wilderness, approximately 12 air miles southeast of the Lake Chelan-Sawtooth Wilderness and approximately 25 air miles southeast of the Glacier Peak Wilderness on the Wenatchee National Forest.

b. Distance From Major Population Centers - The area is approximately 115 air miles northeast of Seattle and approximately 125 air miles northwest of Spokane.

c. Need for Ecosystem Representation - There are no unique ecosytems represented in the area. Ecosystems present are common throughout the area.

d. Proponent Interest, Public Input and Involvement - During the RARE II process, over 1,600 people expressed their preference for allocation of this area. Of these, 4 percent preferred wilderness with or without boundary adjustments, 2 percent preferred further planning with or without boundary adjustments and 94 percent preferred non-wilderness.

Approximately 750 people provided comments to the 1982 Draft Environmental Impact Statement for the Okanogan National Forest Plan. Of these, only 2 percent expressed a preference that this area be allocated to wilderness.

The area was considered for wilderness designation during discussion of the 1984 Washington Wilderness Bill but was not designated.

6. Environmental Consequences

The following table shows the disposition of the area by management area by alternative.

TABLE C-11 Black Canyon Acres by Management Area by Alternative

Mgt.	Alternative									
Area	A(Current Dir)	B	C	D	E	F	G	G(DEP)	H	I
	----------------------thousand acres----------------------									
1	9.7	11.1	-	12.9	-	9.1	11.1	11.1	-	-
4	-	-	-	-	-	-	-	-	-	12.9
4m	-	-	-	-	12.9	-	-	-	-	-
5	1.8	-	1.8	-	-	-	-	-	-	-
9	1.4	-	.7	-	-	3.8	-	-	2.1	-
14	-	1.8	10.4	-	-	-	1.8	1.8	10.8	-
Total	12.9	--								

a. Soils and Water - The relative rating of soil and water impacts is shown in the following table.

TABLE C-12 Black Canyon Soil and Water Impacts

Alt.	Riparian Areas (0-5 rating)	Mgt. Areas 0-10 rating)	Timber & Roads (0-13 rating)	Total
A	2	7	1	10
B	3	8	2	13
C	2	6	2	10
D	5	9	2	16
E	1	1	0	2
F	3	8	2	13
G	3	8	2	13
G(Depart)	3	8	2	13
H	3	8	1	12
I	3	1	0	4

Cumulatively, Alternative D would have the most impact on soil and water resources in the area; followed by B, F, H, G and G (Departure), A and C. Alternatives I and E would have no impact on soil and water.

Soil compaction would increase in Alternative D from timber harvest and management area designation. The other alternatives would not greatly increase compaction. Increased soil compaction would reduce vegetative growth and establishment. This would reduce timber yields. Soil water infiltration rates would be reduced and surface soil erosion could increase. Soil ripping of landings and heavily used skid trails after logging operations would reduce the potential impacts. The probability of this practice working is very high.

Stream sediment would increase the most in Alternative D because of the high levels of road construction and timber harvest. Alternatives E and I would have no effect on stream sedimentation loads because no roads would be constructed and no timber would be harvested. The other alternatives would not cause major stream sedimentation increases although there might be temporary sedimentation load increases in small drainages as new roads were constructed. Stream sediment load increases in Alternative D could reduce the water's utility for some uses. Irrigation could be made more expensive because siltation in irrigation canals would increase maintenance costs, decrease the amount of water flow and plug irrigation water delivery devices. Domestic water uses would be more expensive because water filtration would be required.

Only Alternative D would have the possibility of increasing stream water temperature. Temperature increases would be slight to moderate. Constant water temperatures would not be detrimental to other resources. A slight increase in water temperature would be benefical to the fisheries resource. Higher water temperatures would not decrease the water's capability to be used in irrigation. Domestic water use may be slightly affected because some people have developed a taste for water at a specific temperature.

b. Recreation - Cumulatively, all alternatives except E and I would reduce the amount of area providing Semi-Primitive recreation opportunities and increase the amount of area providing Roaded Natural and Roaded Modified recreation opportunities. Alternatives E and I would require new trail construction to provide access within the area.

Alternatives A and C would provide Roaded Natural opportunities on those portions of the area viewed from Highway 153. Alternatives B, D, F, G, G (Departure) and H would provide Roaded Modified recreation opportunities.

c. Wilderness - Alternatives E and I would maintain the option of future consideration of the area for Wilderness through 2030.

The remaining alternatives would reduce the amount of area available for Wilderness consideration in the year 2000. Cumulatively, the most reduction would occur in Alternative D followed by F, C, B, G (Departure), G, A and H. These alternatives would remove the area from future consideration as wilderness by 2030.

d. Wildlife and Ecological - All alternatives except E and I would modify deer range cover. Modifications would be greatest under Alternative D followed by F, C, B, G (Departure), G, A and H. Timber harvest in all alternatives except D would be designed to perpetuate or improve winter range habitat values.

Alternative D would not emphasize deer habitat and would most likely decrease winter range habitat values.

All alternatives except E and I would likely reduce the amount of mixed conifer old growth habitat. The most reduction would occur under Alternative A followed by D, F, B, G (Departure), G, C and H.

All alternatives except E and I would reduce the snag habitat for cavity dwelling wildlife. The most reduction would occur under Alternative D followed by F, B, G (Departure), G, A, C and H.

Forest-wide standards and guidelines would adequately protect blue grouse wintering ridges and key habitats of other wildlife under all alternatives.

e. Range - All alternatives except H would increase forage. Alternatives D and F would provide the most additional forage. Some lose of forage would occur under alternative H.

f. Vegetation and Timber - Under all alternatives, lodgepole pine dominated stands would continue to be the principal forest vegetation.

Alternatives E and I would not permit timber harvest. These alternatives would retain the greatest inventory of salable volume and the greatest timber volume growth in the year 2000. Overall health and vigor of stands would decrease.

The overall health and vigor of timber stands would increase under all alternatives which permit timber management. The greatest increase in overall health would occur under Alternative D.

Under alternatives which permit timber management, Alternative D followed by F and C would result in the largest number of acres regenerated and replaced with seedlings and saplings by the year 2000. Alternatives H, G and G (Departure) would result in the least acres regenerated to seedlings and saplings.

Alternative D would retain the smallest inventory of salable volume and the least timber volume growth in the year 2000. The lower volume growth would occur because seedlings and saplings would not yet be large enough to produce merchantable volume.

Timber volume losses caused by animal damage would increase in proportion to the acres of mature timber stands regenerated to seedlings and saplings.

g. Minerals and Energy - All alternatives except E and I would increase accessibility for minerals. Alternatives B, D, F and G would provide approximately the same amount of increased access; followed by H, A and C. Alternatives E and I would maintain the lack of road access.

h. Fire - The fire suppression strategy for the area would not change under any alternative. All wildfires would be controlled to protect adjacent private land and areas of high resource value outside the area, as well as to keep fires from spreading onto the Wenatchee National Forest.

All alternatives except E and I would increase the fire hazard in the short-term from timber harvest activities. Cumulatively, timber management, including the use of prescribed fire, would increase vegetative diversity and reduce overall fire hazard by creating a mosaic of different age classes within the even-aged lodgepole pine stands found on the western portion of the area. The risk of human-caused fire would increase under all alternatives, except E and I, because of increased access.

i. Insects and Disease - All alternatives except E and I would reduce the probability of serious insect and disease outbreaks because timber stands would be managed.

Alternatives E and I would not manage the timber stands in the area. Some mature stands of lodgepole pine are currently being attacked by mountain pine beetle. Volume losses in the remaining mature stands would be likely. Should beetle populations become epidemic, large volume losses in mature lodgepole pine and immature ponderosa pine in adjacent roaded areas would be likely.

Endemic disease outbreaks would result in some volume and growth loss. The magnitude of loss is not known.

SOUTH RIDGE - 6017
5,700 Acres

1. History

The area was originally inventoried as roadless (6,400 acres) during RARE I. Between 1972 and 1979, timber sales and roads along with new roadless area inventory criteria reduced the size of the area by approximately 200 acres. The 1979 RARE II process allocated the area to non-wilderness management. The 1969 Twisp Ranger District Multiple-Use Plan allocated approximately 1/2 the area to Wildlife Management and the other 1/2 to Timber/Forage Management. Since 1979, approximately 500 acres have been impacted by roads and logging, mostly in the Timber/Range Management allocation.

2. Description (Existing Conditions)

a. Location and Access - The area is located east of Twisp and north of the Loup Loup Highway in the central portion of the Okanogan National Forest. All lands are in Okanogan County. From Twisp, access is provided over State Highways 153 and 20 and County and National Forest Roads in South Fork Beaver Creek.

b. Topography - Most of the area is made up of the broad low east-west South Ridge. Elevations range from 3,000 feet in Beaver Creek to 5,600 feet on top of the ridge.

c. Soils and Soil Types - Soils are derived from glacial till and are coarse textured and well drained. The till is often covered with volcanic ash of varying thickness. Soils with volcanic ash tend to be located on the less steep slopes and ridgetops. Soils with no volcanic ash tend to occur on over-steepened slopes.

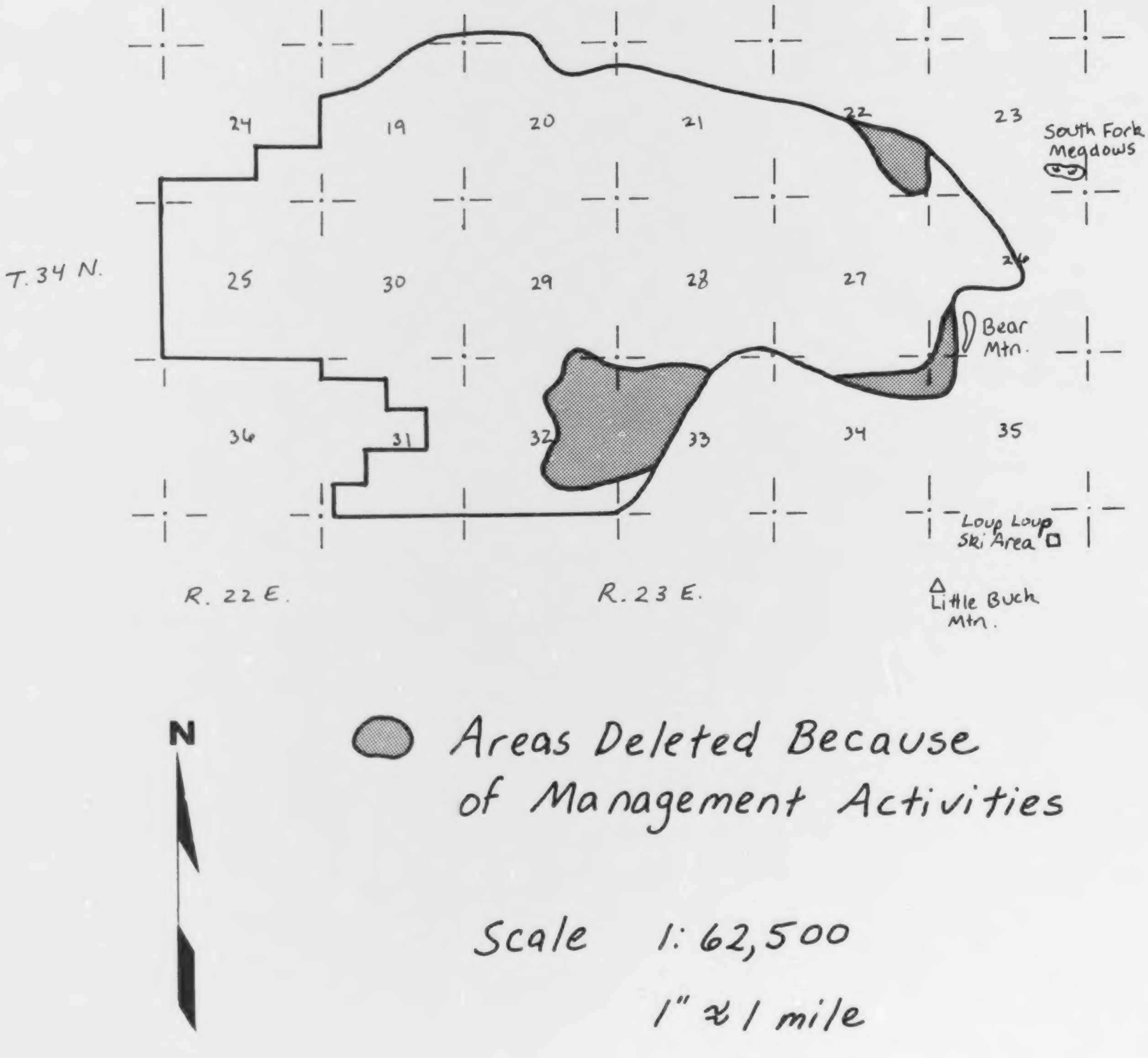
Soils have low to moderate erosion hazards and are considered generally stable for management activities. Mass erosion hazard is low.

d. Vegetation - About 60 percent of the area is tree covered northern exposed slopes. The reminder of the area consists of southern exposed grass and shrub covered slopes with scattered trees. A narrow, marshy meadow lies along a tributary of Beaver Creek between Bear Mountain and South Ridge. Principal tree species are Douglas-fir, lodgepole pine and ponderosa pine. Some subalpine fir and Engelmann spruce is also found.

e. Ecosystem Types - The area is considered spruce-fir forest using Bailey's classification. Under Kuchler's classification, the area is mapped as Douglas-fir forest.

FIGURE C-6

SOUTH RIDGE
ROADLESS AREA
(6017)


24
19
20
21
22
23
South Fork Meadows
T. 34 N.
25
30
29
28
27
26
Bear Mtn.
36
31
32
33
34
35
Loup Loup Ski Area
R. 22 E.
R. 23 E.
Little Buck Mtn.
N
Areas Deleted Because of Management Activities
Scale 1: 62,500
1" ≈ 1 mile

3. Capability (Presence of Wilderness Characteristics)

a. Manageability and Boundaries - The small size of the area would make management as wilderness difficult. There is little opportunity to place boundaries on identifiable topographic features without further reducing the size of the area.

b. Natural Integrity, Appearance and Surroundings - Few human-caused changes have taken place within the area. The major impact on the natural integrity and appearance of the area are several range water developments and a section of drift fence. Except for the long, flat ridge, vegetation and topography are similar to the surrounding area.

c. Opportunities for Solitude, Primitive Recreation and Challenge - Because the entire open southern portion of the area looks into the Methow Valley little opportunity for solitude, primitive recreation and challenge exists.

4. Availability (Other Resource Potentials and Management Considerations)

a. Recreation - Most of the area provides Semi-Primitive, Non-Motorized recreation opportunities with the northern portion of the area near the South Fork Beaver Road providing Roaded Natural opportunities. Except for the long, flat ridge there are no special recreation features and the area does not lend itself to establishment of developed sites. There are no system trails in the area. Recreation use is low due to the lack of trails. Hunting is the primary use.

b. Wildlife - There are no known threatened, endangered or sensitive animals which appear on State, Federal or Forest Service lists. Most of the area is in winter range (1/2 being high density), where both mule and white-tailed deer tend to concentrate. Here dense conifers, which provide protection from both deep snow and cold, and available forage are vital to these herds. Approximately 370 acres of mixed conifer old growth have been field verified, providing some of the most productive habitat types for wildlife. High snag numbers provide excellent habitat for many cavity dwelling animals. Numerous other wildlife common to the forest inhabit the area.

c. Water - South Fork Beaver Creek is the major drainage in or near the area. Several unnamed tributaries drain into South Fork Beaver Creek. These tributaries contribute only a small portion of the annual stream flow because most are intermittent. The Beaver Creek drainage has been adjudicated. There are more water users than there is water in most years. All water uses are off National Forest. Water is used for irrigation, domestic and livestock purposes.

Water quality is high and is not limiting for current uses.

There are no existing power withdrawals, proposed impoundments or known Federal Energy Regulatory Commission permits or licenses outstanding.

d. Range - This area takes in portions of the Beaver and Frazer Cattle Allotments. Approximately ten percent of these allotments are classified unsuitable for grazing. Each allotment is managed under improved rotation grazing systems. Beaver carries 140 head 6/1-9/30 and 50 head 7/1-9/30 for 1003 AUM's. Frazer carries 137 head 6/1-9/30 for 752 AUM's. Of the 36,952 acres in the Beaver allotment only 4722 acres are suitable for grazing. Frazer allotment has 9,699 acres classed suitable out of 13,720 acres.

e. Ecological - There are no known threatened, endangered or sensitive plants in the area which appear on State, Federal or Forest Service lists.

f. Timber - The area contains approximately 4,500 acres of suitable forest land. The majority of these lands support mature mixed conifer and lodgepole pine stands. There is approximately 7.5 million cubic feet (37.3 million board feet) of standing merchantable volume. Potential timber yield is approximately 1.4 million cubic feet (7 million board feet) per decade.

There are no timber sales planned in the area during 1986 on the current Timber Sale Plan. A major portion of 1 sale with a volume of 6.0 million board feet is planned in 1989.

g. Minerals and Energy - This area has low-unknown mineral potential for locatable and leasable minerals. No prospects or mines are known in the area and no mining claims or mineral leases are present.

h. Cultural - The Cultural Resource Overview for the Twisp-Winthrop-Conconully Planning Unit (Bennett 1979) identified no evidence of cultural resources in the area.

i. Land Use - There are no authorized land uses in the area.

j. Fire - This area has experienced 4 lightning and no human-caused fires for the period 1970-1979. The western portion of the area is dominated by a ponderosa pine/annual grass/bitterbrush fuel type that previous studies have identified as critical deer winter range. The remainder of the area is best described as a closed lodgepole and Douglas-fir and ponderosa pine stand where the primary fire carrrier is litter and branchwood deposited on the forest floor. Except

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for the lodgepole pine stands recurrent low intensity fires would reduce fuel accumulation and protect the stands from destructive wildfires. Easy access from perimeter roads has made suppression action relatively simple within the area.

The current fire suppression strategy is to control all wildfires, with special emphasis on protecting the bitterbrush component of the designated deer winter range (USDA 1983).

Application and use of unplanned ignitions (re. lightning and human-caused) to accomplish other resource objectives is not permitted under the current management direction.

k. Insects and Disease - During the past 5 years, low levels of mortality in lodgepole and ponderosa pine were observed during annual surveys. Mortality was caused by endemic populations of western pine beetle and mountain pine beetle. The existing stands of lodgepole pine are highly susceptible to mountain pine beetle. Dwarf mistletoes are common in Douglas-fir stands. The nature and extent of root rot diseases is not known.

l. Private Lands - There is no private land within the area and no known outstanding subsurface rights.

5. Need

a. Nearby Wilderness Areas - The area is approximately 25 air miles south of the Pasayten Wilderness, approximately 20 air miles east of the Lake Chelan-Sawtooth Wilderness and approximately 35 air miles east of the Glacier Peak Wilderness on the Wenatchee National Forest.

b. Distance From Major Population Centers - The area is approximately 130 air miles northeast of Seattle and approximately 130 air miles northwest of Spokane.

c. Need for Ecosystem Representation - There are no unique ecosystems represented in the area. Ecosystems present are common throughout the area.

d. Proponent Interest, Public Input and Involvement - During the RARE II process, over 1,500 people expressed their preference for allocation of this area. Of these, 4 percent preferred wilderness with or without boundary adjustments, 1 percent preferred further planning with or without boundary adjustments and 95 percent preferred non-wilderness.

Approximately 750 people provided comments to the 1982 Draft Environmental Impact Statement for the Okanogan National Forest Plan. No preference was expressed for allocating this area to wilderness.

The area was considered for wilderness designation during discussion of the 1984 Washington Wilderness Bill but was not designated.

6. Environmental Consequences

The following table shows the disposition of the area by management area by alternative.

TABLE C-13 South Ridge Acres by Management Area by Alternative

Mgt. Area	Alternative A(Current Dir)	B	C	D	E	F	G	G(DEP)	H	I
	------------------------thousand acres----------------------									
1	1.5	-	-	5.7	-	1.5	.3	.3	-	-
4	-	-	-	-	5.7	-	-	-	-	-
9	4.2	2.9	5.7	-	-	4.2	3.0	3.0	5.0	1.0
14	-	2.8	-	-	-	-	2.4	2.4	.7	4.7
Total	5.7------------ -->									

a. Soils and Water - The relative rating of soil and water impacts is shown in the following table.

TABLE C-14 South Ridge Soil and Water Impacts

Alt.	Riparian Areas (0-5 rating)	Mgt. Areas (0-10 rating)	Timber & Roads 0-13 rating)	Total
A	2	6	1	9
B	3	7	1	11
C	2	6	1	9
D	5	9	1	15
E	1	1	0	2
F	3	7	1	11
G	3	7	1	11
G(Depart)	3	7	1	11
H	3	7	1	11
I	3	7	0	10

Cumulatively, Alternative D would have the most impact on soil and water resources in the area, followed by the other alternatives.

Soil compaction would not increase in most alternatives because timber harvest levels and the number of roads constructed would be low. Alternative D would cause small soil compaction increases.

None of the alternatives would result in noticeable stream sedimentation load increases although there would be temporary increases in small drainages when new roads are constructed. Current water uses would not be damaged by any alternative.

Only Alternative D would have the possibility of increasing stream water temperature. Temperature increases, if they occur, would be slight. A slight increase in water temperature would be benefical to the fisheries resource. Higher water temperatures would not decrease the water's irrigation use. Domestic water use may be slightly affected because some people have developed a taste for water at a specific temperature.

b. Recreation - Cumulatively, all alternatives except E would reduce the amount of area providing Semi-Primitive recreation opportunities and increase the amount of area providing Roaded Modified recreation opportunities. Alternative E would require new trail construction to provide access within the area.

c. Wilderness - Alternative E would maintain the option of future consideration of the area for Wilderness through 2030.

The remaining alternatives would remove the area from future consideration as wilderness by the year 2000.

d. Wildlife and Ecological - All alternatives except E and I would modify deer range cover. Modifications would be greatest under Alternative D followed by A, B, G, G (Departure), F, H, and C. Timber harvest in all alternatives except D would be designed to perpetuate or improve winter range habitat values.

Alternative D would not emphasize deer habitat and would most likely decrease winter range habitat values.

All alternatives except E and I would likely reduce the amount of mixed conifer old growth habitat. The most reduction would occur under Alternative A followed by D, B, F, G, G (Departure), C and H.

All alternatives except E and I would reduce the snag habitat for cavity dwelling wildlife. The most reduction would occur under Alternative D followed by B, A, F, G, G (Departure), C and H.

Forestwide standards and guidelines would adequately protect blue grouse wintering ridges and key habitats of other wildlife under all alternatives.

e. Range - No change would be noticed in forage under Alternatives G (Departure) and H. Alternative D would provide the greatest increase in forage and all other alternatives only a slight increase.

f. Vegetation and Timber - Under all alternatives, mixed conifer and lodgepole pine dominated stands would continue to be the principal forest vegetation.

Alternatives E and I would not permit timber harvest. These alternatives would retain the greatest inventory of salable volume and the greatest timber volume growth in the year 2000. Overall health and vigor of stands would decrease.

The overall health and vigor of timber stands would increase under all alternatives which permit timber management. The greatest increase in overall health would occur under Alternative D followed by B and F.

Under alternatives which permit timber management, Alternative D followed by B and F would result in the largest number of acres regenerated and replaced with seedlings and saplings by the year 2000. Alternatives G (Departure) and H would result in the least acres regenerated to seedlings and saplings.

Alternative D followed by B and F would retain the smallest inventory of salable volume in the year 2000. Alternative D would have the least timber volume growth in the year 2000. The lower volume growth would occur because seedlings and saplings would not yet be large enough to produce merchantable volume.

Timber volume losses caused by animal damage would increase in proportion to the acres of mature timber stands regenerated to seedlings and saplings.

g. Minerals and Energy - All alternatives except E would increase accessibility for minerals. Cumulatively, Alternative D would provide the most increase; followed by B and G, F, H and I. Alternative E would maintain the lack of road access.

h. Fire - The fire suppression strategy for the area would not change under any alternative. All wildfires would be controlled to protect key deer winter range and high resource values within and adjacent to the area and to protect private land on the area's western boundary.

All alternatives except E and I would increase the fire hazard in the short-term from timber harvest activities. Cumulatively, timber management, including the use of prescribed fire, would increase vegetative diversity and reduce overall fire hazard by treating natural fuels. The risk of human-caused fire would increase under all alternatives, except E and I, because of increased access.

i. Insects and Disease - All alternatives except E and I would reduce the probability of serious insect and disease outbreaks because timber stands would be managed.

Alternatives E and I would not manage the timber stands in the area. Some mature stands of lodgepole pine are currently being attacked by mountain pine beetle. Volume losses in the remaining mature stands would be likely. Should beetle populations become epidemic, large volume losses in mature lodgepole pine and immature ponderosa pine in adjacent roaded areas would be likely.

Endemic disease outbreaks would result in some volume and growth loss. The magnitude of loss is not known.

GRANITE MOUNTAIN - 6018

37,416 Acres

1. History

The area was originally inventoried as three separate roadless areas totaling approximately 54,100 acres during RARE I. The areas were Beaver Creek, Granite Mountain and Pebble Creek. Between 1972 and 1979, timber sales and roads along with new roadless area inventory criteria reduced the size of the area by approximately 12,300 acres. The 1979 RARE II process allocated the area to non-wilderness management. The 1969 Twisp, Winthrop and Conconully Ranger District Multiple Use Plans allocated most of the area to Timber/Forage Management with the remaining allocated to Scenic Viewshed Management. Since 1979, approximately 4,400 acres have been impacted by roads and logging, mostly in the Scenic Viewshed Management allocation.

2. Description (Existing Conditions)

a. Location and Access - The area is located northeast of Winthrop and south of the Middle Salmon-Boulder Creek Road in the central portion of the Okanogan National Forest. All lands are in Okanogan County. From Winthrop, access is provided over County and National Forest Roads in the Chewuch River and a National Forest Road in Boulder Creek.

b. Topography - The western portion of the area is characterized by rounded ridges and V-shaped valleys and canyons. The eastern portion is characterized by broad timbered ridges and V-shaped valleys. The summit of Old Baldy Mountain and the ridge between Old Baldy and Starvation Mountains are the dominant topographic features of the area. Elevations range from 2,600 feet on Boulder Creek to approximately 7,850 on Baldy Mountain.

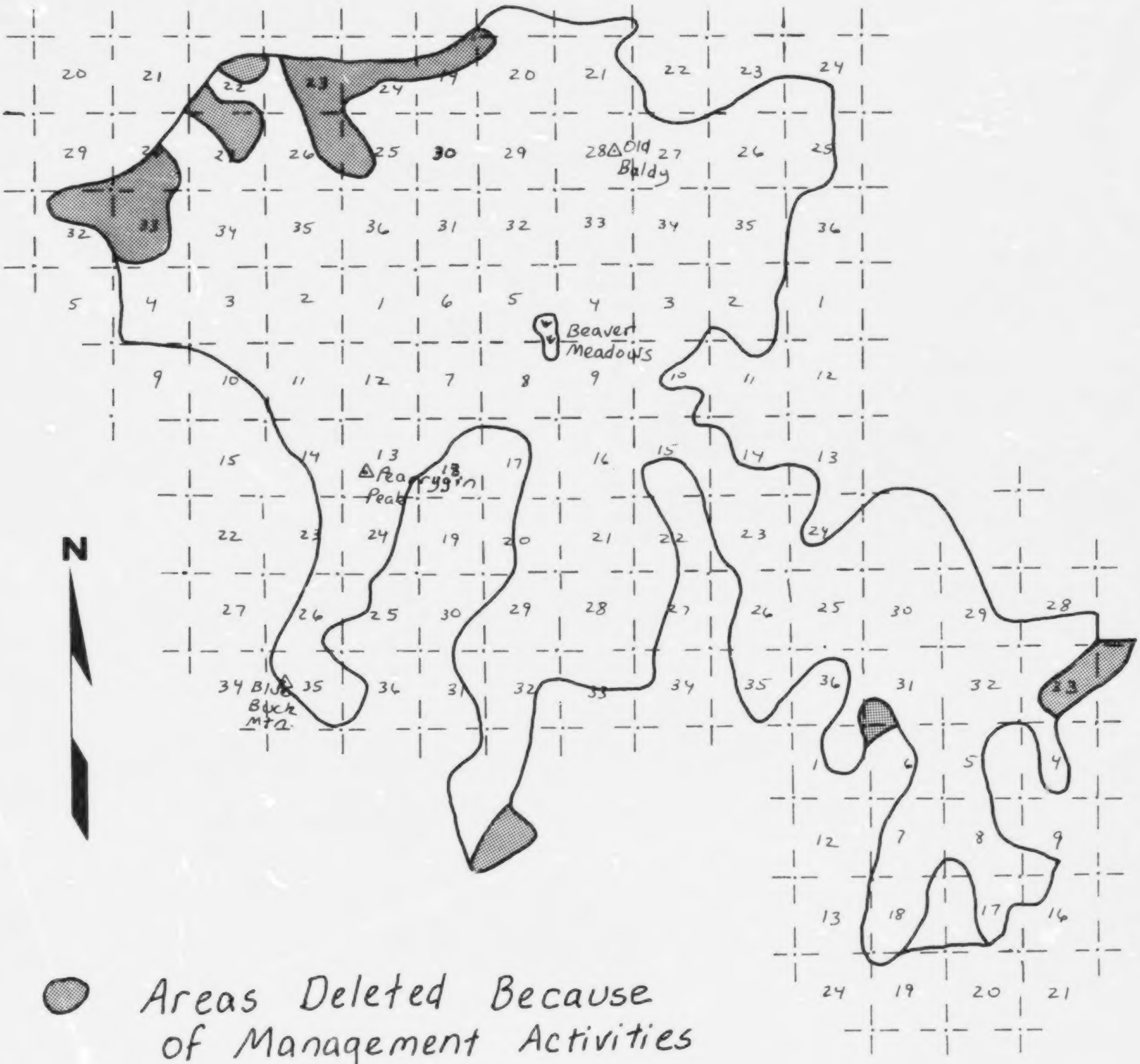
c. Soils and Soil Types - Soils are composed of glacial outwash and tills overlain by volcanic ash of various thickness. Outwash soils near streams are often poorly drained because of high water tables. Soils generally have very high infiltration rates except in areas with year round high water tables.

Soils with surface litter cover have low erosion hazards and are considered generally stable for management activities. Where soils are not covered with litter or large rock fragments, erosion hazards are high. Mass erosion hazards are low throughout the area.

d. Vegetation - Most of the area is covered with trees. Principal tree species in areas without a recent fire history are Douglas-fir and ponderosa pine. Lodgepole pine covers those areas affected by past fires. The higher elevations of

FIGURE C-7

GRANITE MOUNTAIN ROADLESS AREA (6018)


20 21 22 23 24 19 20 21 22 23 24
29 28 27 26 25 30 29 28 27 26 25
32 33 34 35 36 31 32 33 34 35 36
5 4 3 2 1 6 5 4 3 2 1
9 10 11 12 7 8 9 10 11 12
15 14 13 18 17 16 15 14 13
22 23 24 19 20 21 22 23 24
27 26 25 30 29 28 27 26 25 30 29 28
34 35 36 31 32 33 34 35 36 31 32 33
1 6 5 4
12 7 8 9
13 18 17 16
24 19 20 21
Old Baldy
Beaver Meadows
Pearrygin Peak
Blue Buck Mtn.
N

● Areas Deleted Because of Management Activities

Scale ½" = 1 mile

Granite and Starvation Mountains exhibit subalpine characteristics and subalpine fir and Engelmann spruce can be found. Some western larch is also present in the south and east portions of the area. Toward the top of Baldy Mountain stunted trees and heather occur.

e. Ecosystem Types - The area is considered spruce-fir forest using Bailey's classification. Under Kuchler's classification, the area is mapped as Douglas-fir forest.

3. Capability (Presence of Wilderness Characteristics)

a. Manageability and Boundaries - The current configuration of the area would make management of much of the area as wilderness difficult. This is due to the long, narrow fingers on the south portion of the area. Boundaries could be placed on readily defined ridges on the south, east and west, but would require placement on contours on the north. This would greatly reduce the size of the area.

b. Natural Integrity, Appearance and Surroundings - The major impact on the natural integrity and appearance of the area are from the control efforts and timber salvage of the 1970 Forks Fire. A road was built into Beaver Meadows. Approximately 3,400 acres have been precommercially thinned. The area provides some vegetation and topographic diversity not found in surrounding areas.

c. Opportunities for Solitude, Primitive Recreation and Challenge - The area provides moderate opportunity for solitude and challenge. Opportunities for primitive recreation are lacking because no portion of the area is over three miles from a road.

4. Availability (Other Resource Potentials and Management Considerations)

a. Recreation - Most of the central portion of the area provides Semi-Primitive Non-Motorized recreation opportunities. A small amount of Semi-Primitive Motorized opportunity is provided around Pearrygin Peak. The northern portion of the area near the Middle Salmon-Boulder Creek Road provides Roaded Natural opportunities. Past management activities has changed the natural appearance of a small portion of the area. These portions of the area provide Roaded Modified recreation opportunities. Special recreation features are the dominant ridge running south from Baldy Mountain and the Beaver Meadows/Beaver Lake area. The area does not lend itself to the establishment of developed sites. Several trails provide access through the area. Recreation use is low with hunting the primary activity. Beaver Lake, accessed by easy trail, offers fishing and dispersed camping opportunities and is an area of more concentrated use.

b. Wildlife - Three State listed animals of special concern (*Felis lynx* - lynx, *Strix nebulosa* - great gray owl and *Boloria freija* - Freija's Fritillary) are reported to occur in or near the area (Washington State 1985; Brittell 1984). Almost the entire area is part of a larger contiguous expanse of prime lynx habitat. This area has the highest reported density of lynx over the largest single area in the 48 contiguous states (Brittell 1984). About 3,500 acres are in low density winter range, where both mule and white-tailed deer tend to concentrate. Here dense conifers, which provide protection from both deep snow and cold, and available forage are vital to these herds. Approximately 1,160 acres of mixed conifer old growth have been field verified, providing some of the most productive habitat types for wildlife. Snag numbers which are important to cavity dwellers are generally high in mixed conifer stands and low in lodgepole pine stands. Numerous other wildlife common to the forest inhabit the area.

c. Water - A significant portion of the area drains into Salmon Creek, which is an important stream for downstream users. It provides high quality water for Conconully Reservoir, a popular fishing lake and site of Conconully State Park. Water is used for domestic, recreational and irrigation purposes. The remaining portion of the area drains into Beaver Creek, which is an over adjudicated stream. Water is normally denied to junior water right holders during normal or low runoff years. Water is used for irrigation, domestic and livestock purposes. Water quality is high for these uses. A small portion of the area drains into the Chewuch River where the water is important for recreation, irrigation, stockwater and domestic needs. Water quality is high for these uses.

There are no existing power withdrawals, proposed impoundments or known Federal Energy Regulatory Commission permits or licenses outstanding. There is potential for small, part-time hydro projects if power rates rise to high enough levels to support the long distance transfer of electricity.

d. Range - Portions of the Beaver, Ryan, East Chewuck and Salmon Basin Cattle Allotments are within this area. Approximately 12 percent of the Beaver Allotment, 20 percent of the Ryan Allottment, 50 percent of the Chewuch Allotment and 20 percent of the Salmon Basin Allotment are classified as suitable for grazing. Following is the stocking on each allotment:

Allotment	Number	Dates	AUM's
Beaver	50	7/1-9/30	
Beaver	140	6/1-9/30	1003
Ryan	167	6/21-9/30	823
East Chewack	250	6/1-9/30	1320
Salmon Basin	276	6/21-9/30	1222

Grazing systems vary on each allotment but all are under improved rotation grazing management.

e. *Ecological* - One State and Forest Service listed sensitive plant (*Botrychium boreale* - northern grape-fern) is reported to occur in or near the area (Washington State 1985).

f. *Timber* - The area contains approximately 33,500 acres of suitable forest land. The majority of these lands support mature mixed conifer and lodgepole pine stands. Since 1980, about 3,400 acres have been precommercially thinned. There is approximately 57.5 million cubic feet (284.4 million board feet) of standing merchantable volume. Potential timber yield is approximately 10.8 million cubic feet (53.5 million board feet) per decade.

A portion of 1 sale with a volume of 4.0 million board feet is planned in the area on the current Timber Sale Plan. Portions of 2 sales with a volume of 13.0 million board feet are planned during 1987-1988.

g. *Minerals and Energy* - This area is underlain mainly by granitic intrusive and metamorphic rocks considered to have low potential for locatable minerals. Approximately 2,000 acres in the southern extremities of the area offer high potential for prospecting and exploration activities. Rock and stream sediment anomalies for copper, molybdenum, gold, zinc, and uranium suggest possible bulk tonnage or vein targets. Forty-eight lode mining claims or portions of claims are located within the boundaries of the area in this zone. Lesser potential (approximately 1,200 acres medium-low) for possible gold deposits is centered on Starvation Mountain.

Potential for the discovery of oil and gas, geothermal resources and other leasables is considered low. No leases or lease applications are recorded in the area.

h. *Cultural* - The Cultural Resource Overview of the Twisp-Winthrop-Conconully Planning Unit (Bennett 1979) identified evidence of several lookouts, shelters and cabins in the area.

i. *Land Use* - There are no authorized land uses in the area.

j. *Fire* - This area has experienced 17 lightning and 3 human-caused fires for the period 1970-1979. The 1970 Forks Fire burned approximately 6,200 acres. The area is directly affected by the lodgepole pine ecological cycles of mountain pine beetle invasion followed by lightning ignited large scale wildfire occurrences. This ecological phenomenon is responsible for the current lodgepole pine stand structure found in the area today. Resumption of the cycle is anticipated within the next 10 to 20 years based on the currrent stand age, which is highly suseptible to mountain pine beetle attack.

The risk of large fires occurring within the area is high, due to the accumulated natural fuels, from previous mountain pine beetle attacks, and the frequency of actual lightning fires that have occurred within the area.

The current fire suppression strategy is to control all wildfires to protect the commercial forest within and adjacent to the area (USDA 1983).

Application and use of unplanned ignitions (re. lightning and human-caused) to accomplish other resource objectives is not permitted under the current management direction.

k. Insects and Disease - During the past 5 years, mortality in both lodgepole pine and ponderosa pine stands was observed during annual surveys. Mortality was concentrated in the Pebble Creek and Beaver Meadows portion of the area. Mortality was caused by endemic populations of western pine beetle and mountain pine beetle. Existing stands of mature lodgepole pine are highly susceptible to mountain pine beetle. Mortality in mature ponderosa pine stands is expected to continue. Dwarf mistletoes are common in Douglas-fir stands. Root rots occur in mixed conifer stands.

l. Private Lands - There is no private land within the area and no known subsurface rights.

5. Need

a. Nearby Wilderness Areas - The area is approximately 15 air miles south of the Pasayten Wilderness, approximately 12 air miles east of the Lake Chelan-Sawtooth Wilderness and approximately 30 air miles northeast of the Glacier Peak Wilderness on the Wenatchee National Forest.

b. Distance From Major Population Centers - The area is approximately 135 air miles northeast of Seattle and approximately 130 air miles northwest of Spokane.

c. Need for Ecosystem Representation - There are no unique ecosystems represented in the area. Ecosystems present are common throughout the area.

d. Proponent Interest, Public Input and Involvement - During the RARE II process, over 2,500 people expressed their preference for allocation of this area. Of these, 38 percent preferred wilderness with or without boundary adjustments, 1 percent preferred further planning with or without boundary adjustments and 61 percent preferred non-wilderness.

Approximately 750 people provided comments to the 1982 Draft Environmental Impact Statement for the Okanogan National Forest Plan. Of these, 44 percent expressed a preference that this area be allocated to wilderness.

The area was considered for wilderness designation during discussion of the 1984 Washington Wilderness Bill but was not designated.

6. Environmental Consequences

The following table shows the disposition of the area by management area by alternative.

TABLE C-15 Granite Mountain Acres by Management Area by Alternative

Mgt. Area	A(Current Dir)	B	C	D	E	F	G	G(DEP)	H	I
	thousand acres									
1	33.1	29.4	-	37.4	-	-	19.0	19.0	-	-
4	-	6.0	-	-	37.4	20.4	-	-	-	37.4
4m	-	-	-	-	-	17.0	-	-	-	-
5	4.3	-	-	-	-	-	5.1	5.1	-	-
9	-	-	4.4	-	-	-	-	-	4.2	-
12	-	-	33.0	-	-	-	10.8	10.8	33.2	-
14	-	2.0	-	-	-	-	2.5	2.5	-	-
Total	37.4									

a. Soils and Water - The relative rating of soil and water impacts is shown in the following table.

TABLE C-16 Granite Mountain Soil and Water Impacts

Alt.	Riparian Areas (0-5 rating)	Mgt. Areas (0-10 rating)	Timber & Roads (0-13 rating)	Total
A	2	6	5	13
B	3	7	7	17
C	2	6	6	14
D	5	9	7	21
E	1	1	0	2
F	3	1	0	4
G	3	7	5	15
G(Depart)	3	7	5	15
H	3	6	5	14
I	3	1	0	4

Cumulatively, Alternative D would have the most impact on soil and water resources in the area; followed by A, B, C, H, G and G (Departure), I and E.

Soil compaction would increase in Alternatives B and D from the large amount of timber harvest and the management area designation. Alternatives A, C, G, G (Departure) and H would result in some soil compaction increases. Alternatives E, F and I would not increase compaction. Increased soil compaction would reduce vegetative growth and establishment. This would reduce timber yields. Soil water infiltration rates would be reduced and surface soil erosion could increase. Soil ripping of landings and heavily used skid trails after logging operations would reduce the potential impacts. The probability of this practice working is very high.

Stream sediment would increase the most in Alternatives B and D because of the large amount of road construction and timber harvest. Alternatives E, F and I would have no effect on stream sedimentation because few roads would be constructed and little timber would be harvested. The other alternatives would not result in major stream sedimentation increases although there would be temporary increases in small drainages as new roads were constructed. Stream sediment load increases in Alternatives B and D could influence water uses. Irrigation could be more expensive because siltation in irrigation canals would increase maintenance costs, decrease the amount of water flow and plug irrigation water sprinklers. Domestic water uses would be more expensive because water filtration would be required.

Only Alternative D would increase stream water temperature. Temperature increases would be slight to moderate. Constant water temperatures would not be detrimental to other resources. A slight increase in water temperature would be benefical to the fisheries resource. Higher water temperatures would not decrease the water's capability to be used in irrigation. Domestic water use may be slightly affected because some people have developed a taste for water at a specific temperature.

b. Recreation - Cumulatively, all alternatives except E, F and I would reduce the amount of area providing Semi-Primitive recreation opportunities and increase the amount of area providing Roaded Natural and Roaded Modified recreation opportunities. Alternative B would provide a small amount of Semi-Primitive opportunities in the central portion of the area. Alternatives E, F and I would require new trail construction to provide access within the area.

225

Alternatives A, G and G (Departure) would provide Roaded Natural opportunities on those portions of the area viewed from the Middle Salmon-Boulder Road. Alternatives B, C, D and H would provide Roaded Modified recreation opportunities.

c. Wilderness - Alternatives E, F and I would maintain the option of future consideration of the area for wilderness through 2030.

The remaining alternatives would reduce the amount of area available for Wilderness consideration in the year 2000. Cumulatively, the most reduction would occur in Alternative D followed by B, C, G (Departure), G, H and I. These alternatives would remove the area from future consideration as wilderness by 2030.

d. Wildlife and Ecological - All alternatives except E, F and I would modify deer range cover. Modifications would be greatest under Alternative D followed by B, A, C, G (Departure), G and H. Timber harvest in all alternatives except A, B and D would be designed to perpetuate or improve winter range habitat values.

Alternatives A, B and D would not emphasize deer habitat and would most likely decrease winter range habitat values.

All alternatives except E, F and I would likely reduce the amount of mixed conifer old growth habitat. The most reduction would occur under Alternative A followed by D, B, F, G, G (Departure), C and H.

All alternatives except E, F and I would reduce the snag habitat for cavity dwelling wildlife. The most reduction would occur under Alternative D followed by B, A, G (Departure), G, C and H.

All alternatives except A would increase the value of lynx habitat. Only a slight decrease would occur with A. The largest increase would occur under Alternative H followed by G, G (Departure), C, B, D, F, I and E.

Forest-wide standards and guidelines would adequately protect blue grouse wintering ridges and key habitats of other wildlife under all alternatives.

No effect on sensitive plant species would be expected under any alternative.

e. Range - All alternatives except H would greatly increase forage production. Alternative D would provide the greatest increase. Alternative H would allow forage to decrease gradually.

f. Vegetation and Timber - Under all alternatives, mixed conifer and lodgepole pine dominated stands would continue to be the principal forest vegetation.

Alternatives E, F and I would not permit timber harvest. These alternatives would retain the greatest inventory of salable volume and the greatest timber volume growth in the year 2000. Overall health and vigor of stands would decrease.

The overall health and vigor of timber stands would increase under all alternatives which permit timber management. The greatest increase in overall health would occur under Alternatives D and B.

Under alternatives which permit timber managment, Alternatives D and B would result in the largest number of acres regenerated and replaced with seedlings and saplings by the year 2000. Alternatives H and A would result in the least acres regenerated to seedlings and saplings.

Alternatives D and B would retain the smallest inventory of salable volume and the least timber volume growth in the year 2000. The lower volume growth would occur because seedlings and saplings would not yet be large enough to produce merchantable volume.

Timber volume losses caused by animal damage would increase in proportion to the acres of mature timber stands regenerated to seedlings and saplings.

g. Minerals and Energy - All alternatives except E, F and I would increase accessibility for minerals. Cumulatively, Alternative D would provide the most increase; followed by G, A, B, C and H. Alternatives E, F and I would maintain the lack of road access.

h. Fire - Under all alternatives, except E, F and I, the fire suppression strategy would be to control all wildfires. The control strategy would be applied to protect high resource values within and adjacent to the area. Emphasis under the control strategy would be the protection of key deer winter range, lynx habitat and inventoried old growth within the area.

Under Alternatives E, F and I, the fire suppression strategy would be to confine all wildfires.

All alternatives except E, F and I, would increase the fire hazard in the short-term because of timber harvest activities. Cumulatively, timber management, including the use of prescribed fire, would increase vegetative diversity, through the creation of a mosaic of uneven aged stands within the mixed conifer and lodgepole pine biological types. The treating of natural fuels within the lodgepole pine type would also be accomplished through timber harvest activities. The risk of human-caused fire would increase under all alternatives, except E, F and I, because of increased access. Without prompt treatment of timber sale activity slash the potential for large destructive wildfires would remain high.

i. Insects and Disease - All alternatives except B, E, F and I would reduce the probability of serious insect and disease outbreaks because timber stands would be managed.

Alternatives B, E, F and I would not manage the timber stands in the area. Volume and growth losses in ponderosa pine and lodgepole pine stands from mountain pine beetle would likely continue. Because of the large acreage of susceptible trees, the risk of epidemic loss would be high. Should mountain pine beetle become epidemic, very large volume losses would likely result in the adjacent Long Swamp and Tiffany Roadless Areas and adjacent roaded areas.

Volume losses to disease would continue within the area. Disease would have little impact on timber stands in adjacent areas.

TIFFANY - 6019

24,027 Acres

1. History

The area was originally inventoried as roadless during RARE I. The 1979 RARE II process allocated the area to non-wilderness management. The 1969 Conconully Ranger District Multiple-Use Plan allocated most of the interior of the area to Semi-Primitive Recreation Management and the rest of the area to Scenic Viewshed Management. Since 1979, approximately 1,000 acres have been impacted by roads and logging, all in the Scenic Viewshed management allocation.

2. Description (Existing Conditions)

a. Location and Access - The area is located northwest of Conconully in the central portion of the Okanogan National Forest. All lands are in Okanogan County. From Conconully, access is provided over County and National Forest Roads in North Fork Salmon Creek and Middle Fork Salmon Creek.

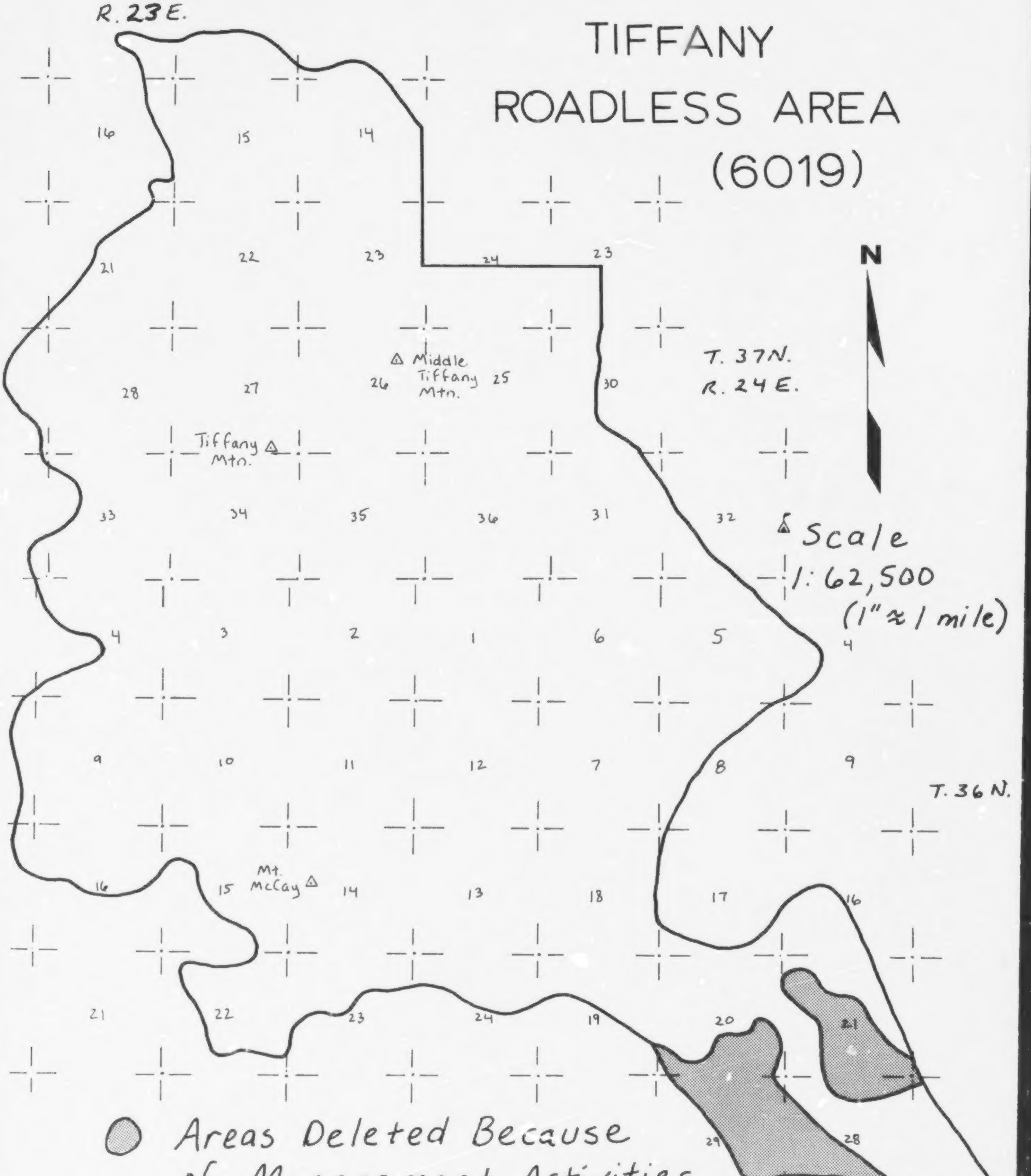
b. Topography - The area encompasses a cluster of high mountain peaks on the major ridge dividing the Chewuch River and Okanogan River drainages. The area includes seven peaks over 7,000 feet. Small streams radiate in all directions from this cluster of mountains. Elevations range from 4,000 feet near Salmon Meadows to approximately 8,250 on Tiffany Mountain.

c. Soils and Soil Types - Soils are composed of glacial outwash and tills overlain by volcanic ash of various thickness. Outwash soils near streams are often poorly drained because of high water tables. Soils generally have very high infiltration rates except in areas with year round high water tables.

Soils with surface litter cover have low erosion hazards and are considered generally stable for management activities. Where soils are not covered with litter or large rock fragments, erosion hazards are high. Mass erosion hazards are low throughout the area.

d. Vegetation - All the higher peaks in the area exhibit Alpine Zone characteristics and are nearly void of trees, supporting only grass and heather. At lower elevations trees occur in wet areas. North facing slopes support dense tree stands with more open areas on drier southern slopes. Principal tree species are Douglas-fir, lodgepole pine and Engelmann spruce. Subalpine fir is present in association with Engelmann spruce and lodgepole pine. Some western larch is present.

FIGURE C-8


R. 23E.
TIFFANY ROADLESS AREA (6019)
16
15
14
21
22
23
24
23
N
Middle Tiffany Mtn.
28
27
26
25
30
T. 37N.
R. 24E.
Tiffany Mtn.
33
34
35
36
31
32
Scale 1:62,500 (1" ≈ 1 mile)
4
3
2
1
6
5
4
9
10
11
12
7
8
9
T. 36N.
16
15
Mt. McCay
14
13
18
17
16
21
22
23
24
19
20
21
29
28
▨ Areas Deleted Because of Management Activities

e. *Ecosystem Types* - The area is considered spruce-fir forest using Bailey's classification. Under Kuchler's classification, the area is mapped as fir-hemlock forest.

3. *Capability (Presence of Wilderness Characteristics)*

a. *Manageability and Boundaries* - The area is a compact unit except for a long, narrow finger on the southeast corner. Boundaries for virtually the entire area would need to be located on contour lines to maintain an area large enough to be managed as wilderness.

b. *Natural Integrity, Appearance and Surroundings* - The major impacts on the natural integrity and appearance of the area are the evidence of range fences, trails, helispots and mining activity. The area provides vegetation and topographic diversity not found in surrounding areas.

c. *Opportunities for Solitude, Primitive Recreation and Challenge* - The openness of the area limits the opportunities for solitude. Primitive recreation opportunities are lacking because no portion of the area is over three miles from a road. Opportunities for challenge are moderate.

4. *Availability (Other Resource Potentials and Management Considerations)*

a. *Recreation* - Most of the interior portion of the area provides Semi-Primitive, Non-Motorized recreation opportunities. Those portions of the area near roads provided Roaded Natural opportunities except on the east portion of the area, where Roaded Modified opportunities are provided. The primary recreation features in the area are the easily accessed lakes and the visually appealing open ridges and mountain peaks. The area does not lend itself to the establishment of developed sites. Several trails provided access through the area. Use in the area is moderate to high because of easy access. Day hiking and horseback riding make up most of the use. The area becomes a popular spot for hunters in the fall. Most recreation use occurs around Tiffany Lake, which is an amazingly fertile lake for such a high elevation. It produces good catches of trout during its ice-free period. Roger Lake and Little Tiffany Lake are much smaller and less fertile.

b. *Wildlife* - Three State listed animal species of special concern (*Boloria freija* - Freija's fritillary, *Polites mystic* - long-dash skipper and *Felis lynx* - lynx) are reported to occur in the area (Washington State 1985; Brittell 1984). The entire area is part of a larger contiguous expanse of prime lynx habitat which has the highest reported density of lynx in the 48 contiguous states (Britell 1984). Approximately 580 acres of mixed conifer old growth have been field verified, providing some of the most productive habitat types for wildlife. Snag numbers for cavity dwellers are estimated to be high in mixed conifer stands and low in the lodgepole pine stands. Seven ridges are identified as providing winter habitat for blue grouse. Numerous other wildlife common to the forest inhabit the area.

c. Water - A significant portion of the area drains into Salmon Creek, an important stream to downstream users. Salmon Creek provides high quality water for Conconully Reservoir, a popular fishing lake and site of Conconully State Park. Water is used for recreational, domestic and irrigation purposes. Most of the remaining portion of the area drains into Twentymile Creek. A small portion drains into Boulder Creek. Both of these streams drain into the Chewuch River where water is important for recreation, irrigation, stockwater and domestic purposes. Water draining from the area is of high quality and is not limiting for any current use.

There are no existing power withdrawals, proposed impoundments or known Federal Energy Regulatory Commission permits or licenses outstanding. There is potential for small, part-time hydro projects if power rates rise to high enough levels to support the long distance transfer of electricity.

d. Range - Portions of the B.S., Ryan, Clark, Mutton and Deadhorse Cattle Allotments are within the area. Approximately 50 percent of the B.S. Allotment, 10 percent of the Ryan Allotment, 60 percent of the Clark Allotment, 90 percent of the Mutton Allotment and 80 percent of the Deadhorse Allotment are classified as unsuitable for grazing.

These allotments are managed under unit rotations, but control between units is generally natural barriers, such as dense timber, rock, steep slope etc. In some cases short drift fences are used. Following is the current stocking:

Allotment	Number	Dates	AUM's
B.S.	208	6/21-9/30	922
Ryan	167	6/21-9/30	823
Clark	168	6/21-9/30	819
Mutton	77	6/21-10/10	156

e. Ecological - Ten State and Forest Service listed sensitive plants (Carex paupercula - poor sedge, Parnassia kotzebuei - Kotzebue's grass-of-Parnassus, Saxifraga cernua - nodding saxifrage, Saxifraga debilis - pygmy saxifrage, Potentilla nivea - snow cinquefoil, Carex atrata var. atrosquama - blackened sedge, Salix tweedyi - Tweedy's willow, Saxifraga integrigolia var. apetala - swamp saxifrage, Dodecatheon pulchellum var. watsonii - shooting star and Carex norvegica - Scandinavian sedge) are reported to occur in the area (Washington State 1985).

f. Timber - The area contains approximately 17,600 acres of suitable forest land. The majority of these lands support mature lodgepole and mixed conifer stands. There is approximately 30.8 million cubic feet (122.7 million board feet) of standing merchantable volume. Potential timber yield is approximately 5.9 million cubic feet (29 million board feet) per decade.

There are no timber sales planned in the area through 1989 on the current Timber Sale Plan.

g. Minerals and Energy - This area includes approximately 3,800 acres of medium-high potential mineral lands in upper Bernhardt Creek and north of Rock Mountain. The former offers prospective value for silver-lead vein deposits, and the latter for post glacial, surficial uranium occurrences. Two patented mining claims encompassing the Bernhardt Mine are present on Clark Peak but no unpatented claims are known in the area. No production is recorded from the Bernhardt Mine.

Potential for leasable minerals, including oil and gas, and geothermal resources is low. No mineral leases or lease applications have been recorded in the area.

h. Cultural - The Cultural Resource Overview of the Twisp-Winthrop-Conconully Planning Unit (Bennett 1979) identified evidence of several lookouts and past mining activity in the area.

i. Land Use - There are no authorized land uses in the area.

j. Fire - This area has experienced 11 lightning and 1 human-caused fire for the period 1970-1979. The lodgepole pine in the area is at the age that it is most susceptible to mountain pine beetle attack. The presence of fire has been principally responsible for the ecosystem found at the higher elevations and in those stands dominated by Douglas-fir and lodgepole pine.

The current fire suppression strategy, based on current management direction, is to confine all wildfires within the area (USDA 1983). The confinement strategy is based on a least cost approach to fire suppression which recognizes the benefits of wildfire on certain ecosystem, but is not part of the decision process to allow wildfires to burn within a designated area. Containment and/or control will be applied when the wildfire has the potential to leave the area and/or the public, capital investment, commercial forest and private land is threatened.

Application and use of unplanned ignitions (re. lightning and human-caused) to accomplish other resource objectives is not permitted under current management direction.

k. Insects and Disease - During the past 5 years, low levels of mortality in lodgepole pine were observed during annual surveys. Mortality was caused by endemic populations of mountain pine beetle. Existing stands of mature lodgepole pine are highly susceptible to mountain pine beetle. Major mortality rates in lodgepole pine stands have been predicted in the next two decades (Dolph 1982). Dwarf mistletoes are common in Douglas-fir stands. The nature and extent of root rot diseases is not known.

l. Private Land - There are approximately 200 acres of private land within the area around the Bernhardt Mine. Access is by trail.

5. Need

a. Nearby Wilderness Areas - The area is approximately 10 air miles south of the Pasayten Wilderness, approximately 15 air miles east of the Lake Chelan-Sawtooth Wilderness and approximately 35 air miles northeast of the Glacier Peak Wilderness on the Wenatchee National Forest.

b. Distance From Major Population Centers - The area is approximately 140 air miles northeast of Seattle and approximately 135 air miles northwest of Spokane.

c. Need for Ecosystem Representation - Approximately 3,000 acres of the area was proposed as the Tiffany Mountain RNA in 1973. The proposed RNA includes six ecological cells listed in "Research Natural Area Needs in the Pacific Northwest" (Dryness and others 1975). Especially notable is the inclusion of three aquatic ecological cells in good condition. These cells are difficult to locate because of the amount of disturbance usually associated with these ecosystems.

d. Proponent Interest, Public Input and Involvement - During the RARE II process, approximately 2,600 people expressed their preference for allocation of this area. Of these, 40 percent preferred wilderness with or without boundary adjustments, 1 percent preferred further planning with or without boundary adjustments and 59 percent preferred non-wilderness.

Approximately 750 people provided comments to the 1982 Draft Environmental Impact Statement for the Okanogan National Forest Plan. Of these, 45 percent expressed a preference that this area be allocated to wilderness.

The area was considered for wilderness designation during discussion of the 1984 Washington Wilderness Bill but was not designated.

6. Environmental Consequences

The following table shows the disposition of the area by management area by alternative.

TABLE C-17 Tiffany [illegible]cres by Management Area by Alternative

Mgt. Area	A(Current Dir)	B	C	D	E	F	G	G(DEP)	H	I
	thousand acres									
1	1.8	21.0	-	24.0	-	-	.6	.6	-	-
4	20.4	-	24.0	-	24.0	24.0	20.4	20.4	-	21.0
5	1.8	-	-	-	-	-	-	-	-	-
8	-	3.0	-	-	-	-	3.0	3.0	3.0	3.0
12	-	-	-	-	-	-	-	-	21.0	-
Total	24.0									

a. Soils and Water - The relative rating of soil and water impacts is shown in the following table.

TABLE C-18 Tiffany Soil and Water Impacts

Alt.	Riparian Areas (0-5 rating)	Mgt. Areas (0-10 rating)	Timber & Roads (0-13 rating)	Total
A	2	4	2	8
B	3	4	7	14
C	2	0	1	3
D	5	4	9	18
E	1	0	1	2
F	3	0	1	4
G	3	1	3	7
G(Depart)	3	1	3	7
H	3	2	5	10
I	3	0	1	4

Cumulatively, Alternative D would have the most impact on soil and water resources in the area; followed by B and H. The remaining alternatives would have no impact on soil and water resources.

Soil compaction would increase in Alternatives B and D from the large amount of timber harvest. The other alternatives would not result in major soil compaction increases. Increased soil compaction would reduce vegetative growth and establishment. This would reduce timber yields. Soil water infiltration rates would be reduced and surface soil erosion could increase. Soil ripping of landings and heavily used skid trails after logging operations would reduce the potential impacts. The probability of this practice working is very high.

Stream sediment would increase the most in Alternatives B and D because of the moderately high levels of timber harvest. Alternatives E and I would have no effect on stream sedimentation because no timber would be harvested. The other alternatives would not cause stream sedimentation increases even though there would be temporary increases in small drainages where new roads were constructed. Stream sediment load increases in Alternatives B and D could reduce the water uses. Irrigation could be more expensive because siltation in irrigation canals would increase maintenance costs, decrease the amount of water flow and plug irrigation water delivery devices. Domestic water uses would be more expensive because water filtration would be required.

Only Alternative D would have the possibility of increasing stream water temperature. Temperature increases would be slight to moderate. Constant water temperatures would not be detrimental to other resources. A slight increase in water temperature would be benefical to the fisheries resource. Higher water temperatures would not decrease the water's capability to be used in irrigation. Domestic water use may be slightly affected because some people have developed a taste for water at a specific temperature.

b. Recreation - Cumulatively, all alternatives except C, E, F and I would reduce the amount of area providing Semi-Primitive recreation opportunities and increase the amount of area providing Roaded Natural and Roaded Modified recreation opportunities. Alternatives A, G and G (Departure) would provide Semi-Primitive opportunities over a major portion of the area. No new trail construction would be required to provide access within the area.

Alternative A would provide Roaded Natural opportunities on those portions of the area not managed for Semi-Primitive recreation opportunities. Alternatives G and G (Departure) would provide mostly Roaded Modified opportunities on those portions of the area not managed for Semi-Primitive recreation opportunities. Alternatives B, D and H would provide Roaded Modified opportunities over the entire area.

c. Wilderness - Alternatives C, E, F and I would maintain the option of future consideration of the area for wilderness through 2030.

Alternatives A, G and G (Departure) would maintain the option of future consideration of a major portion of the area for wilderness through 2030.

Alternatives B, D and H would remove the area from future consideration as wilderness by 2030.

All alternatives except C, E, F and I would reduce the amount of area available for wilderness consideration in the year 2000. Cumulatively, the most reduction would occur in Alternative D followed by B, H, G (Departure), G and A.

d. Wildlife and Ecological - All alternatives except C, E, F and I would likely reduce the amount of mixed conifer old growth habitat. The most reduction would occur with Alternative A followed by D, B, G (Departure), G and H.

All alternatives except C, E, F and I would reduce the snag habitat for cavity dwelling wildlife. The most reduction would occur under Alternative D followed by B, H, G (Departure), A and G.

All alternatives except A would increase the value of lynx habitat. Only a slight decrease would occur with A. The largest increase would occur under Alternative H followed by G, G (Departure), C, B, D, F, I and E.

Forestwide standards and guidelines would adequately protect blue grouse wintering ridges and key habitats of other wildlife under all alternatives.

No effect on sensitive plant species would be expected under any alternative.

e. Range - Alternatives B and D would increase forage production by about 400 percent through the logging of lodgepole pine. All other alternatives would show only a slight increase.

f. Vegetation and Timber - Under all alternatives, lodgepole pine and mixed conifer stands would continue to be the principal forest vegetation.

Alternatives C, E, F and I would not permit timber harvest. These alternatives would retain the greatest inventory of salable volume and the greatest timber volume growth in the year 2000. Overall health and vigor of stands would decrease.

The overall health and vigor of timber stands would increase under all alternatives which permit timber management. The greatest increase in overall health would occur under Alternatives D and B.

Under alternatives which permit timber management, Alternatives D and B would result in the largest number of acres regenerated and replaced with seedlings and saplings by the year 2000. Alternatives A and G would result in the least acres regenerated to seedlings and saplings.

Alternatives D and B would retain the smallest inventory of salable volume and the least timber volume growth in the year 2000. The lower volume growth would occur because seedlings and saplings would not yet be large enough to produce merchantable volume.

Timber volume losses caused by animal damage would increase in proportion to the acres of mature timber stands regenerated to seedlings and saplings.

g. Minerals and Energy - All alternatives except C, E, F and I would increase accessibility for minerals. Cumulatively, Alternatives B and D would provide the greatest increase; followed by H, A and G. Alternatives C, E, F and I would maintain the lack of road access.

h. Fire - Under all alternatives except B, D and H the fire suppression strategy would be to confine all wildfires. The use of the confinement strategy, as a least cost approach to fire suppression, would be evaluated against the potential risk of the wildfire leaving the area, and the threat to the public, capital investments and adjacent private land. If any criteria would be violated, the wildfire would be contained or controlled. Special protection emphasis may be needed to protect critical lynx and inventoried old growth habitat.

Under Alternatives B, D and H, the fire suppression strategy would be to contain or control all wildfires based on the management emphasis of the alternative.

All alternatives except B, D and H would increase the fire hazard in the short-term from timber harvest activities. Cumulatively, timber management, including the use of prescribed fire, would increase vegetative diversity and reduce overall fire hazard by treating natural fuels associated with the even-aged lodgepole pine stands found throughout the area. The risk of human-caused fires due to increased access for timber management purposes would increase the most under Alternatives B, D and H, followed by G and G (Departure).

i. Insects and Disease - Alternatives B, D and H would reduce the probability of serious insect and disease outbreaks because timber stands would be managed.

Alternatives A, C, E, F, G, G (Departure) and I would not manage the timber stands in the area. Volume and growth losses in ponderosa pine and lodgepole pine stands from mountain pine beetle would likely continue. Because of the large acreage of susceptible trees, the risk of epidemic loss would be high. Should mountain pine beetle become epidemic, very large volume losses would likely result in the adjacent

Long Swamp, Granite Mountain and Long Draw Roadless Areas and adjacent roaded areas.

Volume losses to disease would continue within the area. Disease would have little impact on timber stands in adjacent areas.

MT. BONAPARTE - 6021

13,400 Acres

1. History

The area was originally inventoried as roadless during RARE I. The 1979 RARE II process allocated the area to non-wilderness management. The 1979 Tonasket Unit Land Management Plan allocated approximately 9,200 acres to Wildlife Management and the remaining 4,200 acres to Semi-Primitive Recreation Management.

2. Description (Existing Conditions)

a. Location and Access - The area is located northeast of Tonasket in the Okanogan National Forest. All lands are in Okanogan County. From Tonasket, access is provided over State Highway 20 and County Road 9467 and County and National Forest Roads in Bonaparte Creek, Mill Creek and Myers Creek.

b. Topography - The area encompasses the lands surrounding Mt. Bonaparte (one of the highest peaks in Washington east of the Okanogan River). It also includes a prominent ridge that extends southwest and northeast from the peak. Elevations range from approximately 4,500 feet to over 7,200 feet on top of Mt. Bonaparte.

c. Soils and Soil Types - Soils are derived primarily from glacial till. Areas of coarse textured soils may be intermixed with areas of fine textured lacustrine soils. These soils generally have high infiltration rates.

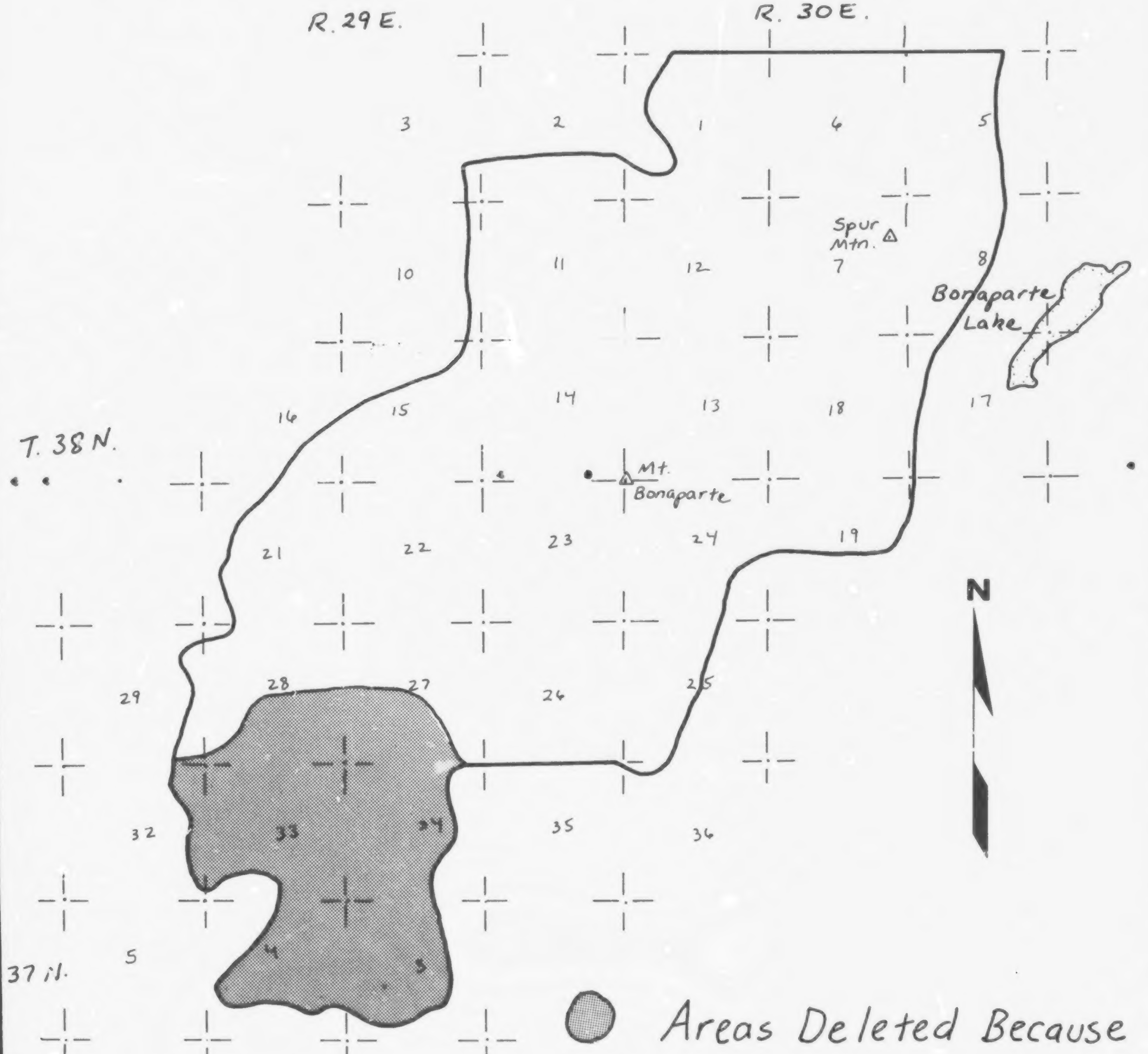
Coarse textured soils have low to moderate erosion hazards and are considered generally stable for management activities. Fine textured soils have a high mass erosion hazard when undercut.

d. Vegetation - The entire area, except for the extreme top of Mt. Bonaparte and a few portions of the eastern edge of the ridge is tree covered. Principal tree species are lodgepole pine, Douglas-fir, western larch and Engelmann spruce. The Lodgepole pine covers that portion south of the peak and the northern portion down to approximately 5,500 feet. Some subalpine fir and ponderosa pine is present. A small portion of the mountain top and ridge has vegetation of a subalpine nature.

e. Ecosystem Types - The area is considered spruce-fir forest using Bailey's classification. Under Kuchler's classification, the area is mapped as Douglas-fir forest.

FIGURE C-9

MT. BONAPARTE ROADLESS AREA (6021)


R. 29 E.
R. 30 E.
3
2
1
6
5
10
11
12
Spur Mtn.
7
8
Bonaparte Lake
16
15
14
13
18
17
T. 38 N.
Mt. Bonaparte
21
22
23
24
19
N
29
28
27
26
25
32
33
34
35
36
37 N.
5
4
3
Areas Deleted Because of Management Activities

Scale 1:62,500
(1" ≈ 1 mile)

3. Capability (Presence of Wilderness Characteristics)

a. Manageability and Boundaries - The relatively small size of the area would make management as wilderness difficult. The area lacks identifiable features which could be used as boundaries to screen users from the sights and sounds of human activity in the surrounding area.

b. Natural Integrity, Appearance and Surroundings - The natural integrity and appearance of the area has generally been maintained. Except for the top of Mt. Bonaparte and the dominant ridge, vegetation and topography are similar to the surrounding area.

c. Opportunities for Solitude, Primitive Recreation and Challenge - Because the area is located mostly on the slopes of Mt. Bonaparte, it is difficult to get away from the sights and sounds of human activity in the surrounding area. Opportunities for solitude are low. Primitive recreation opportunities are lacking because no portion of the area is over three miles from a road. The opportunity for challenge is moderate because of the steepness of the area.

4. Availability (Other Resource Potentials and Management Considerations)

a. Recreation - Most of the interior portion of the area provides Semi-Primitive Motorized recreation opportunities. Some Roaded Natural opportunities are provided on the southern and eastern portions of the area. The northern portion of the area is influenced by adjoining heavy logging activity and provides Roaded Modified opportunities. The primary recreation feature in the area is the Mt. Bonaparte Lookout. The area does not lend itself to the establishment of developed sites. A system of trails is maintained in the area and provides a variety of hiking opportunities from the nearby 5-Lakes Area and nearby roads. The trail system provides access to the top of Mt. Bonaparte. Recreation use is moderate and consists mostly of hunting and day hiking.

b. Wildlife - One State listed animal of special concern (Strix nebulosa - great gray owl) is reported to occur (Washington State 1985). About 1,600 acres are in winter range (2/3 being high density), where both mule and white-tailed deer tend to concentrate. Here dense conifers,which provide protection from both deep snow and cold, and forage are vital to these herds. Approximately 730 acres of mixed conifer old growth have been field verified, providing some of the most productive habitat types for wildlife. Except for inclusions of unmanaged mixed conifer, snag numbers for cavity dwellers are low throughout the lodgepole pine stands. Three ridges are identified as winter habitat for blue grouse. Numerous other wildlife common to the forest inhabit the area.

c. *Water* - The area drains into Myers Creek, Bonaparte Creek, Siwash Creek and Antoine Creek. Water is used for domestic, stockwater and irrigation purposes. Water quality is sufficient for all uses. Myers Creek drains into Canada. An international agreement between the United States and Canada that allows minimum water flows into Canada. While the runoff volume into Myers Creek is not large, it does contribute some of the flow. The other streams drain into adjudicated streams. Water flow from the area is often intermittent, but some contribution to flows does occur from spring snowmelt and ground water flows during the summer and fall.

There are no power withdrawals or known Federal Energy Regulatory Commission projects licensed or under application.

d. *Range* - Approximately 80 percent of this area is unsuitable for grazing livestock. Some of the lower elevations are suitable and cattle will graze up to the natural barriers of dense timber or rock. Portions of the Phoebe, Strawberry and Siwash Cattle Allotments fall within the area. All of these allotments are managed under rest rotation or deferred rotation grazing systems. Approximately 764 AUM'S grazing use is made of this area.

e. *Ecological* - One State and Forest Service listed sensitive plant (*Dodecatheon pulchellum* var. *watsonii* - shooting star) is reported to occur in the area (Washington State 1985).

f. *Timber* - The area contains approximately 5,900 acres of suitable forest land. The majority of these lands support mature lodgepole pine and mixed conifer stands. Stagnant understories often occur beneath the mature trees. There is approximately 10.7 million cubic feet (52.7 million board feet) of standing merchantable volume. Potential timber yield is approximately 2.0 million cubic feet (10 million board feet) per decade.

There are no timber sales planned in the area during 1986 on the current Timber Sale Plan. Portions of 2 sales with a volume of 14.0 million board feet are planned during 1987-1988.

g. *Minerals and Energy* - The entire area is underlain by granodiorite-quartz monzonite of the Mt. Bonaparte pluton. These rocks are considered to have low potential for the discovery of locatable and leasable mineral commodities. No mining claims, leases, or lease applications are present.

h. *Cultural* - The Cultural Resource Overview of the Tonasket Planning Unit (Uebelacker 1978) identified evidence of several cabins in the area. The primary lookout for the Tonasket Ranger District is located on Mt. Bonaparte. This lookout is on the National Register of Historic Places.

i. Land Use - There are no authorized land uses in the area.

j. Fire - The area has experienced 4 lightning and 1 human-caused fire for the period 1970-1979. The species and location of the conifer vegetation found within the area is principally due to elevational changes and historical fire occurrences. The presence oflodgepole pine is indicative of the influence of past fire activity. Recurrent fires would favor the more fire tolerant Douglas-fir and western larch by killing the invading lodgepole pine and creating a favorable seedbed for Douglas-fir and larch.

The relative flammability and risk of a large fire is much lower within the area due to the absence of fine fuels, which act as ignition sources and carrier of wildfires, within the lodgepole pine stands.

The current fire suppression strategy is to confine all wildfires (USDA 1983). Confinement of wildfires, under the current management direction, is based on a least cost approach to fire suppression which recognizes the benefits of wildfire on certain ecosystems, but is not part of the decision process to allow wildfires to burn within a designated area. Containment and/or control will be applied when the wildfire has the potential to leave the roadless area and/or if the public, capital investments, commercial forest, and private land is threatened.

Application and use of unplanned ignitions (re. lightning and human-caused) to accomplish other resource objectives is not permitted under current management direction.

k. Insects and Disease - During the past 5 years, mortality in lodgepole pine was observed during annual surveys. Mortality was caused by endemic populations of mountain pine beetle. It has been predicted that mountain pine beetle will cause major mortality in mature lodgepole pine within the next two decades (Dolph 1982). Dwarf mistletoes are common in Douglas-fir stands. The nature and extent of root rot diseases is not known.

l. Private Lands - There is no private land within the area and no known outstanding subsurface rights.

5. Need

a. Nearby Wilderness Areas - The area is approximately 35 air miles east of the Pasayten Wilderness, approximately 65 air miles northeast of the Lake Chelan-Sawtooth Wilderness and approximately 80 air miles northeast of the Glacier Peak Wilderness on the Wenatchee National Forest.

b. Distance From Major Population Centers - The area is approximately 175 air miles northeast of Seattle and approximately 110 air miles northwest of Spokane.

c. Need for Ecosystem Representation - There are no unique ecosystems represented in the area. Ecosystems present are common throughout the area.

d. Proponent Interest, Public Input and Involvement - During the RARE II process, over 3,100 people expressed their preference for allocation of this area. Of these, 22 percent preferred wilderness with or without boundary adjustments, 29 percent preferred further planning with or without boundary adjustments and 49 percent preferred non-wilderness.

Over 200 people provided comments to the 1978 Draft Environmental Impact Statement for the Tonasket Unit Land Management Plan. Fifteen people expressed their preference for allocation of this area. Of these, 6 preferred wilderness, 6 preferred further planning and 3 preferred non-wilderness.

Approximately 750 people provided comments to the 1982 Draft Environmental Impact Statement for the Okanogan National Forest Plan. Of these, 39 percent expressed a preference that this area be allocated to wilderness.

The area was considered for wilderness designation during discussion of the 1984 Washington Wilderness Bill but was not designated.

6. Environmental Consequences

The following table shows the disposition of the area by management area by alternative.

TABLE C-19 Mt. Bonaparte Acres by Management Area by Alterntive

Mgt.	Alternative									
Area	A(Current Dir)	B	C	D	E	F	G	G(DEP)	H	I
	thousand acres									
1	-	9.2	-	10.9	-	13.4	4.8	4.8	-	-
4	-	4.2	-	-	-	-	-	-	-	13.4
4m	8.6	-	-	-	13.4	-	8.6	8.6	-	-
5	-	-	10.6	2.5	-	-	-	-	-	-
9	4.8	-	-	-	-	-	-	-	-	-
14	-	-	2.8	-	-	-	-	-	13.4	-
Total	13.4									

a. Soils and Water - The relative rating of soil and water impacts is shown in the following table.

TABLE C-20 Mt. Bonaparte Soil and Water Impacts

Alt.	Riparian Areas (0-5 rating)	Mgt. Areas (0-10 rating)	Timber & Roads (0-13 rating)	Total
A	2	4	1	7
B	3	6	1	10
C	2	6	1	9
D	5	8	1	14
E	1	1	0	2
F	3	8	1	12
G	3	3	1	7
G(Depart)	3	3	1	7
H	3	8	1	12
I	3	1	0	4

Cumulatively, Alternative D would have the most impact on soil and water resources in the area; followed by F, H and B. The remaining alternatives would have no impact on soil and water.

Soil compaction would increase slightly in Alternatives B, D and H because of the large amount of timber harvest. The other alternatives would not result in major soil compaction increases. Increased soil compaction would reduce vegetative growth and establishment. This would reduce timber yields. Soil water infiltration rates would be reduced and surface soil erosion could increase. Soil ripping of landings and heavily used skid trails after logging operations would reduce the potential impacts. The probability of this practice working is very high.

Stream sediment loads would not increase under any alternative. There would be little road construction and timber harvest. The alternatives would not cause major stream sedimentation increases although there would be temporary increases in small drainages as new roads were constructed.

Only Alternative D would have the possibility of increasing stream water temperature. Temperature increases would be slight. A slight increase in water temperature would be benefical to the fisheries resource. Higher water temperatures would not decrease the water's capability to be used in irrigation.

b. Recreation - Cumulatively, all alternatives except E and I would reduce the amount of area providing Semi-Primitive recreation opportunities and increase the amount of area providing Roaded Natural and Roaded Modified recreation opportunities. Alternatives A, B, G and G (Departure) would provide

Semi-Primitive opportunities over a large portion of the area. A small amount of new trail construction would be required to provide access within the area.

Alternative C would provide Roaded Natural opportunities on most of the area. Alternatives A, B, G and G (Departure) would provide Roaded Modified opportunities on those portions of the area not managed for Semi-Primitive recreation opportunities. Alternatives D, F and H would provide Roaded Modified opportunities over the entire area.

c. Wilderness - Alternatives E and I would maintain the option of future consideration of the area for wilderness through 2030.

The remaining alternatives would reduce the amount of area available for Wilderness consideration in the year 2000. Cumulatively, the most reduction would occur in Alternatives D and F followed by C, H, B, G (Departure), G and A. These alternatives would remove the area from future consideration as wilderness by 2030.

d. Wildlife and Ecological - All alternatives except E and I would modify deer range cover. Modifications would be greatest under Alternatives D and F followed by C, G (Departure), G, B, H and A. Timber harvest in all alternatives except D and F would be designed to perpetuate or improve winter range habitat values.

Alternatives D and F would not emphasize deer habitat and would most likely decrease winter range habitat values.

All alternatives except E and I would likely reduce the amount of mixed conifer old growth habitat. The most reduction would occur under Alternative A followed by D, B, F, G (Departure), G, C and H.

All alternatives except E and I would reduce the snag habitat for cavity dwelling wildlife. The most reduction would occur under Alternative F followed by D, C, B, H, G (Departure), G and A.

Forest-wide standards and guidelines would adequately protect blue grouse wintering ridges and key habitats of other wildlife under all alternatives.

No effect on sensitive plant species would be expected under any alternative.

e. Range - Forage production under alternatives C, D and F would increase about 65 percent. All other alternatives only increase forage slightly except alternative G which would remain the same.

f. Vegetation and Timber - Under all alternatives, lodgepole pine and mixed conifer stands would continue to be the principal forest vegetation.

Alternatives E and I would not permit timber harvest. These alternatives would retain the greatest inventory of salable volume and the greatest timber volume growth in the year 2000. Overall health and vigor of stands would decrease.

The overall health and vigor of timber stands would increase under all alternatives which permit timber management. The greatest increase in overall health would occur under Alternatives D and F.

Under alternatives which permit timber managment, Alternatives D and F would result in the largest number of acres regenerated and replaced with seedlings and saplings by the year 2000. Alternatives A and G would result in the least acres regenerated to seedlings and saplings.

Alternatives D and F would retain the smallest inventory of salable volume and the least timber volume growth in the year 2000. The lower volume growth would occur because seedlings and saplings would not yet be large enough to produce merchantable volume.

Timber volume losses caused by animal damage would increase in proportion to the acres of mature timber stands regenerated to seedlings and saplings.

g. Minerals and Energy - All alternatives except E and I would increase accessibility for minerals. Cumulatively, Alternative F would provide the most increase; followed by D, H, B, A and C. Alternatives E and I would maintain the lack of road access.

h. Fire - Under all alternatives except E, G, G (Departure) and I, the fire suppression strategy would be to control all wildfires.

Under Alternatives E, G, G (Departure) and I, the fire suppression strategy would be to confine all wildfires based on a least cost approach to fire suppression. Containment and/or control would be applied if the fire has the potential to leave the area or if the public, capital investments, commercial forest land, or private land is threatened.

All alternatives except E and I would increase the fire hazard in the short-term from timber harvest activities. Cumulatively, timber management, including the use of prescribed fire, would increase vegetative diversity and reduce overall fire hazard by treating natural fuels. The risk of human-caused fire would increase under all alternatives, except E and I, because of increased access.

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i. Insects and Disease - Alternatives C, D, F and H would reduce the probability of serious insect and disease outbreaks because timber stands would be managed.

Alternatives A, B, E, G, G (Departure) and I would not manage the timber stands in the area. Volume and growth losses in ponderosa pine and lodgepole pine stands from mountain pine beetle would likely continue. Because of the large acreage of susceptible trees, the risk of epidemic loss would be high. Should mountain pine beetle become epidemic, very large volume losses would likely result in adjacent roaded areas.

Volume losses to disease would continue within the area. Disease would have little impact on timber stands in adjacent areas.

LONG DRAW - 6023

5,482 Acres

1. History

The area was originally inventoried as two separate roadless areas totalling approximately 11,400 acres during RARE I. The areas were 14-mile (8,600 acres) and Long Draw (2,800 acres). The RARE II process combined the two areas and recommended that the Long Draw portion be added to the Pasayten Wilderness and the 14-mile portion be allocated to non-wilderness management. The Washington State Wilderness Bill of 1984 added the Long Draw portion and approximately 2,900 acres of the 14-mile portion to the Pasayten Wilderness. An additional 200 acres has been impacted by roads and logging since 1979. The remainder of the 14-mile portion would be managed as Scenic Viewshed as per the allocation in the 1969 Conconully Ranger District Multiple-Use Plan.

2. Description (Existing Conditions)

a. Location and Access - The area is located northwest of Tonasket in the north central portion of the Okanogan National Forest. All lands are in Okanogan County. From Tonasket, access is provided over U.S. Highway 97, County Road 9425 and County and National Forest Roads in Toats Coulee Creek area.

b. Topography - The area consists of high elevation broad rolling ridges. Elevations range from approximately 5,200 feet to over 6,700 feet.

c. Soils and Soil Types - Soils are derived from glacial till and are overlain with volcanic ash of varying thickness. Outwash soils near streams are often poorly drained because of high water tables. Soils generally have very high infiltration rates except in areas with year round high water tables.

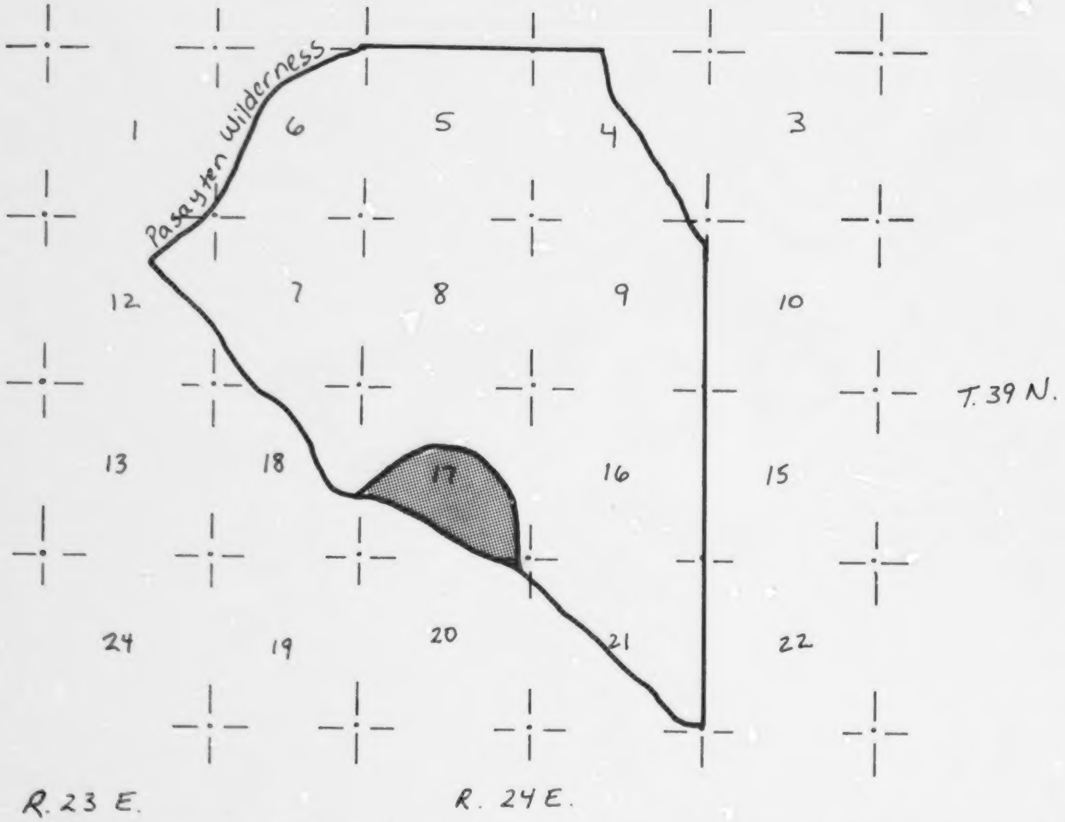
Ash soils become very dusty when dry. Trails may become very dusty when dry under moderate to heavy use. Soils without the ash layer tend to be stable during dry periods. Soils with surface litter cover have low erosion hazards and are considered generally stable for management activities. Where soils are not covered with litter or are very shallow, erosion hazards are moderate. Mass erosion hazards are generally low.

d. Vegetation - Southern slopes in the area are grass and shrub covered while the northern slopes are covered with shrubs and trees. The principal tree specie is young lodgepole pine which is the result of fires which occurred in the 1930's and 1940's. Some Douglas-fir, western larch, subalpine fir, Engelmann spruce and ponderosa pine also exist.

FIGURE C-10

LONG DRAW

ROADLESS AREA (6023)


Pasayten Wilderness
1
6
5
4
3
12
7
8
9
10
T. 39 N.
13
18
17
16
15
24
19
20
21
22
R. 23 E.
R. 24 E.

▨ Areas Deleted Because of Management Activities

Scale 1:62,500
(1" ≈ 1 mile)

e. Ecosystem Types - The area is considered spruce-fir forest using Bailey's classification. Under Kuchler's classification, the area is mapped as fir-hemlock forest.

3. Capability (Presence of Wilderness Characteristics)

a. Manageability and Boundaries - Although this area adjoins the south boundary of the Pasayten Wilderness, management as wilderness would be difficult because a long, narrow finger between two roads would be created.

b. Natural Integrity, Appearance and Surroundings - There is little evidence of human activity inside the area. Roads bordering both sides carry primarily recreation traffic. Some precommercial thinning has occurred along the Toats Coulee Road. The views from within the area to the south and east show timber management activity on National Forest, State of Washington and private lands. Vegetation and topography are not greatly different from the surrounding area.

c. Opportunities for Solitude, Primitive Recreation and Challenge - The area provides limited opportunities for solitude and challenge. No opportunity for primitive recreation exists because no portion of the area is over three miles from a road.

4. Availability (Other Resource Potentials and Management Considerations)

a. Recreation - A portion of the interior of the area provides Semi-Primitive, Non-Motorized recreation opportunities. The exterior portions of the area are influenced by roads and provide Roaded Natural opportunities. There are no special recreation features available and the area does not lend itself to the eastablishment of significant developed sites. A small section of one system trail, which provides access to the Pasayten Wilderness, passes through the northeast corner of the area. Although the gentle, open brush and grass slopes lend themselves to cross-country hiking and horseback riding, recreation use remains low because of the lack of focal points in the area.

b. Wildlife - A Federal and State listed threatened animal (Ursus arctos - grizzly bear) and two State listed animals of special concern (Accipiter gentilis - goshawk and Felis lynx - lynx) have been reported to occur in the area (Washington State 1985; Brittell 1984). There have been no recent confirmed grizzly bear sightings. The entire area is part of a larger contiguous expanse of prime lynx habitat which has the highest reported density of lynx in the 48 contiguous states (Britell 1984). From 700 to 900 acres of mixed conifer old growth are estimated to exist, providing some of the most productive habitat types for wildlife. Snag numbers for cavity dwellers are estimated to be high in the small inclusions of mixed conifer stands and low throughout the lodgepole pine stands. Numerous other wildlife common to the forest inhabit the area.

c. Water - The area drains into North Fork Toats Coulee Creek which drains into Spectacle and Whitestone Lakes. Recreation and irrigation are the primary water uses. There is livestock use of water out of perennial and intermittent streams and at stockwater developments. The water is of high quality and is sufficient for current uses.

Water yield on a per acre basis is significant. Annual water yields average three to four feet runoff. For comparison, runoff from low lands on the National Forest are less than 1/2 foot per year.

There are no existing power withdrawals, proposed impoundments or known Federal Energy Regulatory Commission permits or licenses.

d. Range - A small portion of the Toats Coulee Cattle Allotment is within this area. Most of the allotment within the area is suitable for grazing.

e. Ecological - There are no known endangered, threatened or sensitive plants which appear on State, Federal or Forest Service lists.

f. Timber - The area contains approximately 3,500 acres of suitable forest land. The majority of these lands support immature lodgepole pine stands. During the early 1970's, a small amount of precommercial thinning occurred along the Toats Coulee Road. There is approximately 3 million cubic feet (16 million board feet) of standing merchantable volume. Potential timber yield is approximately 1.2 million cubic feet (6 million board feet) per decade.

There are no timber sales planned in the area during 1986 on the current Timber Sale Plan. A portion of 1 sale with a volume of 5.5 million board feet is planned in 1987.

g. Minerals and Energy - Approximately 2,400 acres of this area offer medium-low probability for the discovery of post glacial, surficial uranium deposits. No mining claims or prospects are known in the area.

Leasable mineral potential is low and no leases or lease applications are present.

h. Cultural - The Cultural Resource Overview of the Twisp-Winthrop-Conconully Planning Unit (Bennett 1979) identified no evidence of cultural resources in the area.

i. Land Use - There are no authorized land uses in the area.

j. Fire - This area has experienced 2 lightning and 2 human-caused fires for the period 1970-1979. The area is dominated by lodgepole pine produced from the ecological cycle of mountain pine beetle invasion follow by the occurence of large fires within the beetle killed stands. The proximity of the area to private land, currently under intensive timber management, and the heavily used Iron Gate Road, contributes the most to the potential risk of a wildfire occurring. The lodgepole pine stands are very suseptible to Mountain Pine Beetle attack based on their age and the low moisture conditions associated with roadless area's location.

The current fire suppression strategy is to control all wildfires to protect commercial forest within and adjacent to the area, the public, and private land which borders a portion of the area (USDA 1983).

Application and use of unplanned ignitions (re. lightning and human-caused) to accomplish other resource objectives is not permitted under the current management direction.

k. Insects and Disease - During the past 5 years, low levels of mortality in lodgepole pine stands were observed during annual surveys. Mortality was caused by endemic populations of mountain pine beetle. The remaining existing stands of mature lodgepole pine are highly susceptible to mountain pine beetle. Dwarf mistletoes are common in Douglas-fir stands. The nature and extent of root rot diseases is not known.

l. Private Lands - There is no private land within the area and no known outstanding subsurface rights.

5. Need

a. Nearby Wilderness Areas - The area adjoins the Pasayten Wilderness and is approximately 30 air miles northeast of the Lake Chelan-Sawtooth Wilderness and approximately 60 air miles northeast of the Glacier Peak Wilderness on the Wenatchee National Forest.

b. Distance From Major Population Centers - The area is approximately 155 air miles northeast of Seattle and approximately 145 air miles northwest of Spokane.

c. Need for Ecosystem Representation - There are no unique ecosystems represented in the area. Ecosystems present are common throughout the area.

d. Proponent Interest, Public Input and Involvement - During the RARE II process, over 3,000 people expressed their preference for allocation of this area. Of these, 46 percent preferred wilderness with or without boundary adjustments, 2 percent preferred further planning with or without boundary adjustments and 52 percent preferred non-wilderness.

Approximately 750 people provided comments to the 1982 Draft Environmental Impact Statement for the Okanogan National Forest Plan. Of these, 47 percent expressed a preference that this area be allocated to wilderness.

The area was considered for wilderness designation during discussion of the 1984 Washington Wilderness Bill. Approximately 2,900 acres were added to the Pasayten Wilderness and the remaining 5,482 acres were not designated.

6. Environmental Consequences

The following table shows the disposition of the area by management area by alternative.

TABLE C-21 Long Draw Acres by Management Area by Alternative

Mgt.	Alternative									
Area	A(Current Dir)	B	C	D	E	F	G	G(DEP)	H	I
	thousand acres									
1	-	5.5	-	5.5	-	5.5	-	-	-	-
4	-	-	5.5	-	5.5	-	-	-	-	5.5
5	5.5	-	-	-	-	-	4.3	4.3	-	-
12	-	-	-	-	-	-	1.2	1.2	5.5	-
Total	5.5	------	------	------	------	------	------	------	------	------

a. Soils and Water - The relative rating of soil and water impacts is shown in the following table.

TABLE C-22 Long Draw Soil and Water Impacts

Alt.	Riparian Areas (0-5 rating)	Mgt. Areas (0-10 rating)	Timber & Roads (0-13 rating)	Total
A	2	3	1	6
B	3	8	1	12
C	2	1	0	3
D	5	9	1	15
E	1	1	0	2
F	3	8	1	12
G	3	4	1	8
G(Depart)	3	4	1	8
H	3	6	1	10
I	3	1	0	4

None of the alternatives would noticeably impact soil and water resources.

Soil compaction would increase slightly in Alternatives B, D, G and G (Departure). It would not increase in the other alternatives. Increased soil compaction would reduce vegetative growth and establishment. Soil water infiltration rates would be reduced and surface soil erosion could increase. Soil ripping of landings and heavily used skid trails after logging operations would reduce the potential impacts. The probability of this practice working is very high.

Stream sediment would not increase. The alternatives could increase the temporary sedimentation in small drainages as new roads were constructed.

Alternative D would slightly increase stream water temperature. A slight increase in water temperature would be benefical to the fisheries resource. Higher water temperatures would not decrease the water's capability to be used in irrigation. Domestic water use may be slightly affected because some people have developed a taste for water at a specific temperature.

b. Recreation - Cumulatively, all alternatives except C, E and I would reduce the amount of area providing Semi-Primitive recreation opportunities and increase the amount of area providing Roaded Natural and Roaded Modified recreation opportunities.

Alternative A would provide Roaded Natural opportunities over the entire area. Alternatives G and G (Departure) would provide Roaded Natural opportunities over most of the area. Alternatives B, D, F and H would provide Roaded Modified opportunities over the entire area.

c. Wilderness - Alternatives C, E and I would maintain the option of future consideration of the area for wilderness through 2030.

The remaining alternatives would reduce the amount of area available for wilderness consideration in the year 2000. Cumulatively, the most reduction would occur in Alternatives D and F followed by C, H, B, G (Departure), G and A. These alternatives would remove the area from future consideration as wilderness by 2030.

The remaining alternatives would remove the area from future consideration as wilderness by the year 2000.

d. Wildlife and Ecological - All alternatives except C, E and I would likely reduce the amount of mixed conifer old growth habitat. The most reduction would occur under Alternative A followed by D, F, B, G (Departure), G and H.

All alternatives except C, E and I would reduce the snag habitat for cavity dwelling wildlife. The most reduction would occur under Alternatives D and F followed by B, G (Departure), G, A and H.

All alternatives except A would increase the value of lynx habitat. Only a slight decrease would occur under A. The largest increase would occur under Alternative H followed by G, G (Departure), C, B, D, F, I and E.

Forest-wide standards and guidelines would adequately protect blue grouse wintering ridges and key habitats of other wildlife under all alternatives.

e. Range - Forage production would be maintained or increased under all alternatives. Alternatives D and F would nearly double forage production.

f. Vegetation and Timber - Under all alternatives, lodgepole pine stands would continue to be the principal forest vegetation.

Alternatives C, E and I would not permit timber harvest. These alternatives would retain the greatest inventory of salable volume and the greatest timber volume growth in the year 2000. Overall health and vigor of stands would decrease.

The overall health and vigor of timber stands would increase under all alternatives which permit timber management. The greatest increase in overall health would occur under Alternatives D and F.

Under alternatives which permit timber management, Alternatives D and F would result in the largest number of acres regenerated and replaced with seedlings and saplings by the year 2000. Alternatives A and H would result in the least acres regenerated to seedlings and saplings.

Alternatives D and F would retain the smallest inventory of salable volume and the least timber volume growth in the year 2000. The lower volume growth would occur because seedlings and saplings would not yet be large enough to produce merchantable volume.

Timber volume losses caused by animal damage would increase in proportion to the acres of mature timber stands regenerated to seedlings and saplings.

g. Minerals and Energy - All alternatives except C, E and I would increase accessibility to known mineral areas. Cumulatively, Alternatives B and F would provide the greatest increase; followed by D, G, A and H. Alternatives C, E and I would maintain the lack of road access.

h. Fire - Under all alternatives the fire suppression strategy would be to control all wildfires to protect adjacent private land and adjacent areas of higher resource value. The overall small size of the area and the absence of natural barriers and fuel breaks precludes application of a confinement fire strategy due.

All alternatives, except C, E and I, would increase the fire hazard in the short-term from timber harvest activities. Cumulatively, timber management, including the use of prescribed fire, would increase vegetative diversity and reduce overall fire hazard by treating natural fuels. The risk of human-caused fire would increase under all alternatives, except C, E and I, because of increased access.

i. Insects and Disease - All alternatives except C, E and I would reduce the probability of serious insect and disease outbreaks because timber stands would be managed.

Alternatives C, E and I would not manage the timber stands in the area. Volume and growth losses in ponderosa pine and lodgepole pine stands from mountain pine beetle would likely continue. Because of the large acreage of susceptible trees, the risk of epidemic loss would be high. Should mountain pine beetle become epidemic, very large volume losses would likely result in the adjacent Long Swamp Roadless Area and adjacent roaded areas. Stands in the adjacent Pasayten Wilderness would likely be at risk.

Volume losses to disease would continue within the area. Disease would have little impact on timber stands in adjacent areas.

LONG SWAMP - 6024

80,540 Acres

1. History

The area was originally inventoried as seven separate roadless areas totaling approximately 105,800 acres during RARE I. The areas were Disaster Creek (6,900 acres), Falls Creek (7,300 acres), Farewell Creek (5,600 acres), Long Swamp (20,500 acres), 30-mile (21,600 acres), 20-mile (40,600 acres) and Lake Creek (3,300 acres). Between 1972 and 1979, timber sales and roads along with new roadless area inventory criteria reduced the total size of these areas by approximately 3,500 acres. The RARE II process combined the seven areas and designated approximately 10,200 acres of the Long Swamp portion for further planning for possible wilderness designation and the remaining portions were allocated for non-wilderness management. The Washington State Wilderness Bill of 1984 added approximately 21,600 acres of the Long Swamp and Lake Creek portions to the Pasayten Wilderness. An additional 200 acres have been impacted by roads and logging since 1979. Approximately 50 percent of the remaining portions of the area would be managed for Timber/Forage and the remaining 50 percent would be managed as Scenic Viewshed as per the allocations in the 1969 Winthrop and Conconully Multiple-Use Plans.

2. Description (Existing Conditions)

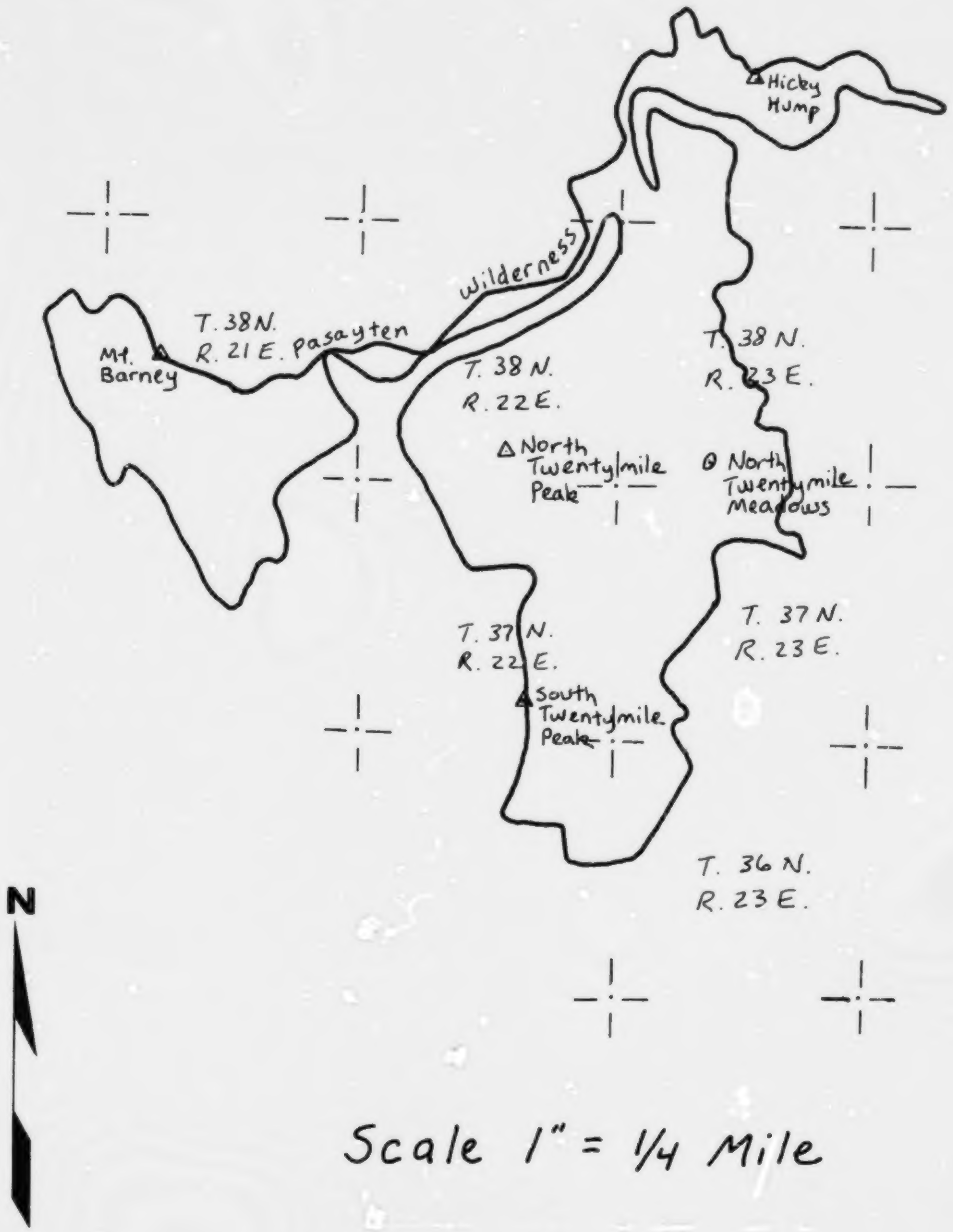
a. Location and Access - Most of the area is located east of Tonasket except for the Farewell Creek portion which is located north of Winthrop. The entire area is located in the north central portion of the Okanogan National Forest and all lands are in Okanogan County. From Tonasket, access to most of the area is provided over U.S. Highway 97, County Road 9425 and County and National Forest Roads in the Toats Coulee and 20-mile and 30-mile Meadows areas. From Winthrop, access to the Farewell Creek portion of the area is provided over County and National Forest Roads in the Chewuch River and 8-mile Creek drainages.

b. Topography - Topography within the area varies greatly. The western portion of the area is characterized by deep canyons with moderately steep slopes topped by rounded or benched off ridgetops. Falls Creek flows through a gentle U-shaped valley. North of the Toats Coulee Road broad ridges occur in the east portion and the west portion plunges down to the steep walled Chewuch River. The 20-mile and 30-mile areas are characterized by high, gentle ridges, but a number of stream have cut steep, deep canyons. Elevations range from 2,000 feet to approximately 7,450 on North 20-mile Peak.

c. Soils and Soil Types - Soils are derived from glacial till and are overlain with volcanic ash of varying thickness. Outwash soils near streams are often poorly drained because

FIGURE C-11

LONG SWAMP ROADLESS AREA (6024)


Hicky Hump
Wilderness
Pasayten
T. 38 N.
R. 21 E.
Mt. Barney
T. 38 N.
R. 22 E.
T. 38 N.
R. 23 E.
North Twentymile Peak
North Twentymile Meadows
T. 37 N.
R. 22 E.
T. 37 N.
R. 23 E.
South Twentymile Peak
T. 36 N.
R. 23 E.
N
Scale 1" = 1/4 Mile

of high water tables. Soils are shallow on the oversteepened slopes plunging directly into the Chewuch River. Rock outcrops are common along these slopes. Soils generally have very high infiltration rates except in areas with year round high water tables.

Ash soils become very dusty when dry. Trails may become very dusty when dry under moderate to heavy use. Soils without the ash layer tend to be stable during dry periods.

In the eastern portion of the area, soils covered with litter have low erosion hazards and are considered generally stable for management activities. Where soils are not covered with litter or are very shallow, erosion hazards are moderate. Mass erosion hazards are generally low.

In the western portion of the area, soils covered with litter have low to moderate erosion hazards and are considered generally stable for management activities. Where soils are not covered with litter, erosion hazards are moderate to high. Mass erosion hazards, in the form of debris avalanches, is high near Chris Creek and low to moderate throughout the remainder of the area.

d. Vegetation - Most of the area north of the Toats Coulee Road is covered with trees at lower elevations. Non-forested areas include the steep rocky parts of the Chewuch River Canyon and the southern slopes between the Toats Coulee Road and the Irongate Road. In the 20-mile and 30-mile Meadows areas dense lodgepole pine, indicating past fire history, covers the higher elevations. Stringers of Engelmann spruce and Douglas-fir growing along drainages and open south slopes occasionally break up the dense canopy. Scattered Douglas-fir and ponderosa pine occur at lower elevations and in the Chewuch River Canyon. Most of the area near Farewell Peak lies in the Mountain Forest Zone. Upper elevation ridgetops exhibit subalpine characteristics.

e. Ecosystem Types - The area is considered spruce-fir forest using Bailey's classification. Under Kuchler's classification, the area is mapped as Douglas-fir forest.

3. Capability (Presence of Wilderness Characteristics)

a. Manageability and Boundaries - It would be difficult to manage much of the area as an addition to the Pasayten Wilderness. Adding this area to the Pasayten Wilderness would create long protrusions from the existing boundaries along not readily defined features such as contour lines. The lack of readily defined features along most of the boundary also reduces the capability of managing the area as a separate wilderness even though a large area is involved.

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b. Natural Integrity, Appearance and Surroundings - The major impact on the natural integrity and appearance of the area are the evidence of trails and a short drift fences. Most of the area provides vegetation and topographic diversity not found in surrounding areas.

c. Opportunities for Solitude, Primitive Recreation and Challenge - The opportunities for solitude range from low around the exterior of the area to moderate in the interior of the 20-mile and 30-mile portions of the area. Opportunities for primitive recreation are low because only a very small portion of the area is over three miles from roads. Opportunities for challenge are low to moderate.

4. Availability (Other Resource Potentials and Management Considerations)

a. Recreation - A block of land in the 20-mile and 30-mile portion of area provides Semi-Primitive Non-Motorized and Semi-Primitive, Motorized recreation opportunities. A large portion of the area has been influenced by adjacent roads and provides Roaded Natural recreation opportunities. The most significant recreation features are the meadows themselves. The area does not lend itself to the establishment of developed sites. Numerous trails provide access through the area. Several of these trails are considered major access routes to the Pasayten Wilderness. Recreation use is low throughout the area except on trails passing through the area and leading to the Pasayten Wilderness where use is moderate to high.

b. Wildlife - A Federal and State listed threatened animal (Ursus arctos - grizzly bear) and four State listed animals of special concern (Aquila chrysaetos - golden eagle, Felis lynx - lynx, Synaptomys borealis - northern bog lemming and Boloria freija - Freija's fritillary) have been reported to occur in or near the area (Washington State 1985). There have been no recent confirmed sightings of grizzly bear. The entire area is part of a larger contiguous expanse of prime lynx habitat which has the highest reported density of lynx in the 48 contiguous states (Brittell 1984). Approximately 1,750 acres of mixed conifer old growth has been field verified, providing some of the most productive habitat types for wildlife. Snag numbers for cavity dwellers are estimated to be high in the small inclusions of mixed conifer stands and low throughout the lodgepole pine stands. Nine areas are indentified as providing winter habitat for grouse. Numerous other wildlife common to the Forest inhabit the area.

c. Water - Most of the area drains into the Chewuch River which is on the Nationwide Inventory of Wild and Scenic Rivers. Water is used for irrigation, stockwater, domestic and recreation purposes. The water quality is high for all current uses. The remaining portion of the area drains into North

Fork Toats Coulee which drains into Spectacle and Whitestone Lake. Recreation and irrigation are the primary uses of the water. Livestock use water out of perennial and intermittent streams and at stockwater developments. The water quality is high and is sufficient for all current uses.

Water yield on a per acre basis is significant. Annual water yields average three to four feet runoff as compared to annual runoffs of 1/2 foot from low lands on the National Forest.

There are no existing power withdrawals, proposed impoundments or known Federal Energy Regulatory Commission permits or licenses.

d. Range - Grazing in this area is on small portions of the Cub and East Chewack and most of the Toats Coulee Cattle Allotments. Of the 53,600 acres in the Toats Coulee Allotment, approximately 43,000 acres are unsuitable for grazing. The 10,600 acres classified as suitable are scattered and require much movement of cattle to utilize. Management is under a four pasture deferred rotation system. Total estimated use is 655 animal unit months.

e. Ecological - Three State and Forest Service listed sensitive plants (Carex norvegica - Scandinavian sedge, Botrychium boreale - northern grape-fern and Polemonium viscosum - skunk polemonium) have been reported to occur in or near the area (Washington State 1985).

f. Timber - The area contains approximately 58,400 acres of suitable forest land. The majority of these lands support mature lodgepole pine stands. Mixed conifer stands are found at mid and lower elevations. There is approximately 92.1 million cubic feet (455.9 million board feet) of standing merchantable volume. Potential timber yield is approximately 17.2 million cubic feet (85.1 million board feet) per decade.

There are no timber sales planned in the area during 1986 on the current Timber Sale Plan. Major portions of 3 sales with a volume of 12.2 million board feet are planned in 1987-1989. Portions of 2 sales with a volume of 13.0 million board feet are also planned during 1987-1989.

g. Minerals and Energy - This area includes approximately 5,900 acres having medium-high potential for mineral exploration and development. These acres are located near Bernhardt Creek (600 acres) and Twentymile Camp (5,300 acres). Expected targets in these areas are respectively, gold-silver-lead veins; post glacial, surficial uranium deposits; and gold-bearing veins. In addition a small portion (500 acres) of the Twentymile Camp area offers high potential for a bulk tonnage molybdenum deposit. The western part of the area includes approximately 14,000 acres having medium-low potential for surficial uranium deposits.

Potential for discovering oil and gas, geothermal resources, and other leasable minerals is considered low throughout the area. No leases or lease applications are present.

h. Cultural - The Cultural Resource Overview of the Twisp-Winthrop-Conconully Planning Unit (Bennett 1979) identified evidence of several cabins and several lookouts in the area.

i. Land Use - There are no authorized land uses in the area.

j. Fire - This area has experienced 26 lightning and 8 human-caused fires for the period 1970-1979. This area, for the purpose of the fire analysis, is broken into two geographically separated areas represented by two different fire occurrence rates.

The major portion of the area straddles the major ridge of mountains that separates the Chewuch and Okanogan River drainages. All of the fires, with the exception of one human-caused fire, have occurred within this area.

An annual grass fuel type, associated with the open conifer stands, is the usual fire carrier at the lower elevations while the fuel type associated with the lodgepole pine is composed of heavy dead and down fuel in association with understory perenial grasses and forbs.

Due to the closed canopy configuration, associated with the lodgepole pine stands, the overall flammability is much less than the stands found at lower elevation, under normal weather conditions. Past fire activity within the area reflects this fact. The majority of the lightning fires that have occurred have been less than a 1/4 of an acre in size, but the potential for large destructive fires is always present given the heavy fuel loadings found within the lodgepole pine stands and a wildfire entering from below.

Changes in microclimate (re. humidity and temperature) below the closed canopy directly affects the overall flammability of the lodepole pine type. The microclimate is changed when the stands are invaded by mountain pine beetle or through timber harvest. The latter affords a better opportunity, through prompt treatment of the residual fuel left after harvest, to prevent large scale destruction of the lodgepole stands within the area.

The remaining portion of the area lies west of the Chewuch River and and runs from the Pasayten Wilderness south along Farewell and Falls Creek Drainages. This area is much higher in elevation and the forest communities present are more representative of subalpine types. Lodgepole pine again occupies the majority of the area, which is indicative of the historical role of fire.

Lightning fires have not played a major role in the recent past within this portion of the area. The higher elevation and shortened summer fire season are the two major contributing factors that have reduced the ignition potential.

The current fire suppression strategy is to control all wildfires to protect commercial forest within and adjacent to the area, the public, and capital investments (USDA 1983). Rapid initial attack is required over most of the area due to the potential for large destructive wildfires to occur within the lodgepole pine type.

Application and use of unplanned ignitions (re. lightning and human-caused) to accomplish other resource objectives is not permitted under the current management direction.

k. Insects and Disease - During the past 5 years, mortality in lodgepole pine was observed during annual surveys. Mortality was caused by endemic populations of mountain pine beetle. Existing stands of mature lodgepole pine are highly susceptible to mountain pine beetle. It is predicted that the mountain pine beetle will cause major mortality in mature lodgepole pine stands within the next two decades (Dolph 1982). Dwarf mistletoes are common in Douglas-fir stands. Extensive areas of laminated root rot are known to occur in Douglas-fir stands west of North Twentymile Peak. Incidence of root disease in the remainder of the area is unknown.

l. Private Lands - There is no private land within the area and no known outstanding subsurface rights.

5. Need

a. Nearby Wilderness Areas - The area adjoins the Pasayten Wilderness and is approximately 25 air miles northeast of the Lake Chelan-Sawtooth Wilderness and approximately 35 air miles northeast of the Glacier Peak Wilderness on the Wenatchee National Forest.

b. Distance From Major Population Centers - The area is approximately 135 air miles northeast of Seattle and approximately 145 air miles northwest of Spokane.

c. Need for Ecosystem Representation - There are no unique ecosystems represented in the area. Ecosystems present are common throughout the area.

d. Proponent Interest, Public Input and Involvement - During the RARE II process, over 3,500 people expressed their preference for allocation of this area. Of these, 55 percent preferred wilderness with or without boundary adjustments, 2 percent preferred further planning with or without boundary adjustments and 43 percent preferred non-wilderness.

Approximately 750 people provided comments to the 1982 Draft Environmental Impact Statement for the Okanogan National Forest Plan. Of these, 53 percent expressed a preference that this area be allocated to wilderness.

The area was considered for wilderness designation during discussion of the 1984 Washington Wilderness Bill. Approximately 21,600 acres were added to the Pasayten Wilderness and the remaining 80,540 acres were not designated.

6. Environmental Consequences

The following table shows the disposition of the area by management area by alternative.

TABLE C-23 Long Swamp Acres by Management Area by Alternative

Mgt.	Alternative									
Area	A(Current Dir)	B	C	D	E	F	G	G(DEP)	H	I
	thousand acres									
1	31.2	80.5	-	80.5	-	80.5	19.9	19.9	-	-
4	-	-	58.9	-	60.0	-	-	-	-	80.5
4m	-	-	21.6	-	20.5	-	-	-	-	-
5	29.3	-	-	-	-	-	9.6	9.6	-	-
12	-	-	-	-	-	-	51.0	51.0	67.3	-
14	-	-	-	-	-	-	-	-	13.2	-
Total	80.5	----	----	----	----	----	----	----	----	----

a. Soils and Water - The relative rating of soil and water impacts is shown in the following table.

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TABLE C-24 Long Swamp Soil and Water Impacts

Alt.	Riparian Areas (0-5 rating)	Mgt. Areas (0-10 rating)	Timber & Roads (0-13 rating)	Total
A	2	6	7	15
B	3	8	12	23
C	2	1	0	3
D	5	9	13	27
E	1	1	0	2
F	3	8	12	23
G	3	6	7	16
G(Depart)	3	6	7	16
H	3	7	7	17
I	3	1	0	4

Cumulatively, Alternatives B, D and F would have the most impact on soil and water resources in the area; followed by A, G, G (Departure), and H. Alternatives E and I would have no impact on soil and water resources.

Soil compaction would increase in Alternatives B, D and F from the large amount of timber harvest and the management area designation. The remaining alternatives would result in slight or no soil compaction increases. Increased soil compaction would reduce vegetative growth and establishment. This would reduce timber yields. Soil water infiltration rates would be reduced and surface soil erosion could increase. Soil ripping of landings and heavily used skid trails after logging operations would reduce the potential impacts. The probability of this practice working is very high.

Stream sediment would increase the most in Alternatives B, D and F because of the high levels of road construction and timber harvest. Alternatives E and I would have little to no effect on stream sedimentation loads because no roads would be constructed and no timber would be harvested. The other alternatives would not cause major stream sedimentation load increases although there would be temporary increases in small drainages as new roads were constructed. Stream sediment load increases in Alternatives B, D, and F could reduce the water use. Irrigation could be more expensive because siltation in irrigation canals would increase maintenance costs, decrease the amount of water flow and plug irrigation water sprinklers. Domestic water uses would be more expensive because water filtration would be required.

Alternative D would slightly increase stream water temperature. A slight increase in water temperature would be benefical to the fisheries resource. Higher water temperatures would not decrease the water's capability to be used in irrigation. Domestic water use may be slightly affected because some people have developed a taste for water at a specific temperature.

b. Recreation - Cumulatively, all alternatives except C, E and I would reduce the amount of area providing Semi-Primitive recreation opportunities and increase the amount of area providing Roaded Natural and Roaded Modified recreation opportunities. Alternatives C, E and I would require new trail construction to provide access within the area.

Alternative A would provide Roaded Natural opportunities on those portions of the area viewed from adjoining roads. Alternatives G and G (Departure) would provide Roaded Natural opportunities on smaller portions of the area viewed from adjoining roads. Alternatives B, D, F and H would provide Roaded Modified opportunities over the entire area.

c. Wilderness - Alternatives C, E and I would maintain the option of future consideration of the area for wilderness through 2030.

The remaining alternatives would reduce the amount of area available for Wilderness consideration in the year 2000. Cumulatively, the most reduction would occur in Alternative D followed by F, B, A, H, G (Departure) and G. These alternatives would remove the area from future consideration as wilderness by 2030.

d. Wildlife and Ecological - All alternatives except C, E and I would likely reduce the amount of mixed conifer old growth habitat. The most reduction would occur under Alternative A followed by D, F, B, G (Departure), G and H.

All alternatives except C, E and I would reduce the snag habitat for cavity dwelling wildlife. The most reduction would occur with Alternative D followed by F, B, A, G (Departure), G and H.

Forest-wide standards and guidelines would adequately protect blue grouse wintering ridges and key habitats of other wildlife under all alternatives. No effect on threatened animal species would be expected under any alternative.

No effect on sensitive plant species would be expected under any alternative.

e. Range - Forage production would nearly double under Alternatives B, D and F and decrease slightly under Alternatives G, G Departure and H. Other alternatives would remain the same or decrease slightly over time due to no logging activity.

f. Vegetation and Timber - Under all alternatives, lodgepole pine dominated stands would continue to be the principal forest vegetation.

Alternatives C, E and I would not permit timber harvest. These alternatives would retain the greatest inventory of salable volume and the greatest timber volume growth in the year 2000. Overall health and vigor of stands would decrease.

The overall health and vigor of timber stands would increase under all alternatives which permit timber management. The greatest increase in overall health would occur under Alternative D.

Under alternatives which permit timber management, Alternative D followed by F and B would result in the largest number of acres regenerated and replaced with seedlings and saplings by the year 2000. Alternatives G and G (Departure) would result in the least acres regenerated to seedlings and saplings.

Alternative D followed by F and B would retain the smallest inventory of salable volume in the year 2000. Alternative D would have the least timber volume growth in the year 2000. The lower volume growth would occur because seedlings and saplings are not yet large enough to produce merchantable volume.

Timber volume losses caused by animal damage would increase in proportion to the acres of mature timber stands regenerated to seedlings and saplings.

g. Minerals and Energy - All alternatives except C, E and I would increase accessibility to known mineral areas. Cumulatively, Alternatives B and F would provide the greatest increase; followed by D, G, A and H. Alternatives C, E and I would maintain the lack of road access.

h. Fire - Under all alternatives the fire suppression strategy would be to control all wildfires to protect commercial forest land within and adjacent to the area, the public and capital investments. The absence of natural barriers and fuel breaks within the area precludes application of a confinement fire strategy.

All alternatives except C, E and I would increase the fire hazard in the short-term from timber harvest activities. Cumulatively, timber management, including the use of prescribed fire, would increase vegetative diversity and reduce overall fire hazard by treating natural fuels. The risk of human-caused fire would increase under all alternatives except C, E and I because of increased access.

i. Insects and Disease - Alternatives A, B, D, F and H would reduce the probability of serious insect and disease outbreaks because timber stands would be managed.

Alternatives C, E and I would not manage the timber stands in the area. Volume and growth losses in ponderosa pine and lodgepole pine stands from mountain pine beetle would likely continue. Because of the large acreage of susceptible trees, the risk of epidemic loss would be high. Should mountain pine beetle become epidemic, very large volume losses would likely result in the adjacent Long Draw, Tiffany, Granite Mountain and Pasayten Rim Roadless Areas and adjacent roaded areas. Stands in the adjacent Pasayten Wilderness would likely be at risk.

Volume losses to disease would continue within the area. Disease would have little impact on timber stands in adjacent areas.

PASAYTEN RIM - 6025

15,410 Acres

1. History

The area was originally inventoried as two separate roadless areas totalling approximately 15,400 acres during RARE I. The areas were Sherman Peak (12,000 acres) and Last Chance (3,400 acres). The RARE II process combined the two areas and allocated the area to non-wilderness management. The 1969 Winthrop Ranger District Multiple Use Plan allocated the area to Scenic Viewshed Management.

2. Description (Existing Conditions)

a. Location and Access - The area is located northwest of Winthrop in the central portion of the Okanogan National Forest and consists of a long, narrow band of land along the south edge of the Pasayten Wilderness. All lands are located in Okanogan County. From Winthrop, access is provided over State Highway 20 and County and National Forest Roads in the Chewuch River, 8-mile Creek, Lost River and Hart's Pass areas.

b. Topography - The western portion of the area consists of a long, narrow (1/2 mile wide) band of southwest facing slope between the Hart's Pass Road and the Pasayten Wilderness. The remaining portion of the area consists of a narrow band of steep, glaciated slopes with elevations generally above 5,000 feet. Elevations range from 2,500 feet on the steep sloped Lost River Gorge to over 8,400 feet on Big Craggy Peak.

c. Soils and Soil Types - Much of the western portion of the area has been extensively glaciated. Soils are derived from granitic glacial till overlain with volcanic ash or pumice of varying thickness. Deposits of glacial outwash occur on valley floors. Organic material is common on the soil surface and is incorporated in deeper soils, commonly in the upper 20 inches. On the eastern portion of the area, soils are derived from glacial till overlain with volcanic ash of varying thickness. Areas of glacial outwash occur. Soils are well to very well drained throughout the area except near streams with high water tables.

Ash soils become very dusty when dry. Trails may become very dusty when dry under moderate to heavy use. Soils without the ash layer tend to be stable during dry periods.

Soils naturally covered with litter have low erosion hazards and are considered generally stable for management activities. Moderate to severe rilling and gullying occurs when water is concentrated on soils not covered with litter. Mass

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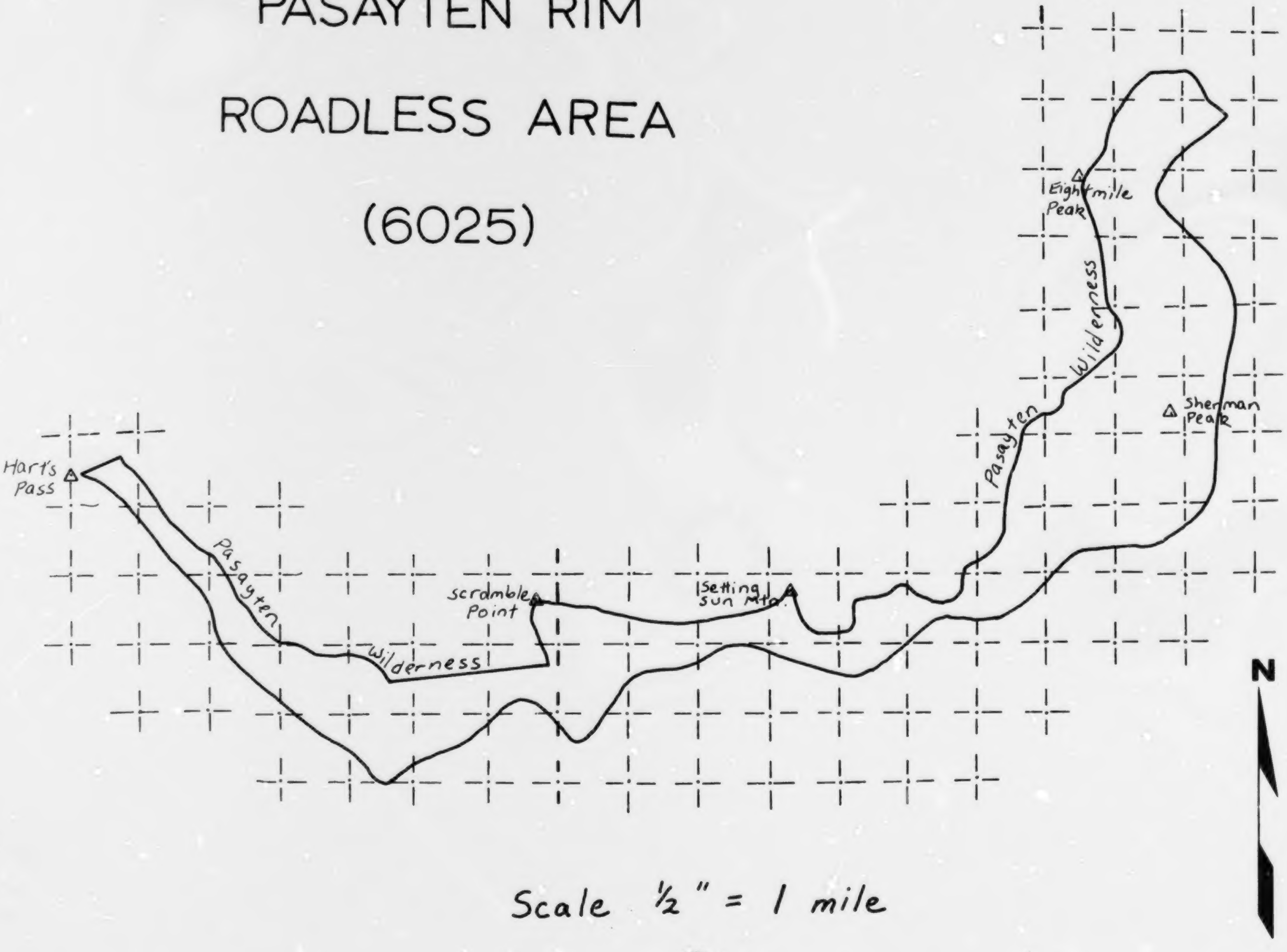
PASAYTEN RIM
ROADLESS AREA
(6025)


Hart's Pass
Pasayten Wilderness
Scramble Point
Setting Sun Mtn.
Eightmile Peak
Pasayten Wilderness
Sherman Peak
N

Scale ½" = 1 mile

FIGURE C-12

erosion hazard is moderate to very high on oversteepened slopes and low throughout the remaining area.

d. Vegetation - Most of the area lies in the subalpine and alpine zones. Treeless areas occur where soil is shallow. The highest rocky peaks are practically void of vegetation. Principal tree species are Douglas-fir and lodgepole pine at the lower elevations and Engelmann spruce in draws. Some subalpine fir and whitebark pine can be found. Western red cedar and western white pine is found in the Lost River area.

e. Ecosystem Types - The area is considered spruce-fir forest using Bailey's classification. Under Kuchler's classification, the area is mapped as western spruce-fir forest.

3. Capability (Presence of Wilderness Characteristics)

a. Manageability and Boundaries - This area could be added to the Pasayten Wilderness but would relocate the existing boundary from a definable ridgetop to nondefinable features such as contour lines.

b. Natural Integrity, Appearance and Surroundings - The major impacts to the natural integrity and appearance of the area are a road with two small clearcuts that date to the early 1960's in upper Whiteface Creek, helispots in open areas near the ridgeline and mining activity from Copper Glance Lake to Billy Goat Pass. Vegetation and topographic diversity is similar to that found in the Pasayten Wilderness.

c. Opportunities for Solitude, Primitive Recreation and Challenge - Opportunities for solitude are low because roads and timber harvest activities to the south are visible from within the area. Primitive recreation opportunities are lacking because no portion of the area is over three miles from a road. The opportunity for challenge is high because of the steep, rugged topography.

4. Availability (Other Resource Potentials and Management Considerations)

a. Recreation - Most of the area provides Semi-Primitive, Non-Motorized recreation opportunities except for that portion adjacent to the Hart's Pass Road and a small portion in 8-mile Creek which provide Roaded Natural opportunities. The primary recreation feature in the area is the spectacular scenery and the steep rugged slopes. The area does not lend itself to the establishment of significant developed sites. The rugged slopes limit access through the area to a few trails which access the Pasayten Wilderness. Most of the recreation use occurs on these trails and is considered moderate to high. Off trails, use is low and consists mainly of fishing at Copper Glance Lake and hunting during the fall.

b. Wildlife - A Federal and State listed threatened animal (Ursus arctos - grizzly bear) and six State listed animals of special concern including one Forest Service sensitive species as indicated by * (Aquila chrysaetos - golden eagle, Arvicola richardsoni - water vole, * Gulo gulo - wolverine, Picoides arcticus - three-toed woodpecker, Plebejus aquilo - high mountain blue and Polygonia oreas - Oreas anglewing) have been reported to occur in or near the area (Washington State 1985). There have been no recent confirmed sightings of grizzly bear. One area of yearlong mountain goat habitat is included. From 100 to 200 acres of mixed conifer old growth are estimated to exist, providing some of the most productive habitat types for wildlife. Snag numbers for cavity dwellers are estimated to be high in mixed conifer stands and low in lodgepole pine stands. Numerous other wildlife common to the Forest inhabit the area.

c. Water - Most of the area drains into 8-mile Creek which drains into the Chewuch River which is on the Nationwide Inventory of Wild and Scenic Rivers. Water is used for irrigation, stockwater, domestic and recreation purposes. Water has high quality for all uses. The western portion of the area drains into the Methow River which is also on the Nationwide Inventory of Wild and Scenic Rivers. Water is used for domestic, recreation, stockwater and irrigation purposes. Water quality is high and suitable for all current uses.

There are no existing power withdrawals, proposed impoundments or known Federal Energy Regulatory Commission permits or licenses.

d. Range - A small portion of the Cub and Goat Cattle Allotments are within this area. Approximately fifty percent of the land is classed as suitable for grazing. Management is under a deferred rotation system. Cub is stocked 6/1-10/15 with 584 head for 3469 AUM's and Goat 6/1-9/30 with 170 head for 898 AUM's.

e. Ecological - Three State and Forest Service listed sensitive plants (Agoseris elata - tall agoseris, Carex atrata var. erecta - erect blackened sedge and Polemonium viscosum - skunk polemonium) have been reported to occur in or near the area (Washington State 1985). In addition, Poa grayana - Gray's bluegrass has been reported to occur in the area. A highly unusual assemblage of plants of the genus Castilleja - Indian Paint Brush also occurs.

f. Timber - The area contains approximately 3,400 acres of suitable forest land. The majority of these lands support mature mixed conifer and lodgepole pine stands. Over half of the suitable land is not capable of producing 20 cubic feet per acre per year. There is approximately 4.6 million cubic feet (22.9 million board feet) of standing merchantable volume. Potential timber yield is approximately .7 million cubic feet (3.5 million board feet) per decade.

There are no timber sales planned in the area through 1989 on the current Timber Sale Plan.

g. Minerals and Energy - This area includes approximately 3,200 acres having high and approximately 2,300 acres having medium-high mineral potential in the upper Eightmile Creek drainage. Numerous prospects and mines are present in the area and exploration and/or development work has occurred sporadically since 1910. A small amount of gold, silver, and copper was produced from at least two of the mines between 1914 and 1935. Current exploration targets in the area include gold-silver-copper veins, disseminated copper, and possible volcanogenic massive sulfide base and precious metal deposits. Core drilling was performed in the area as late as 1979. Approximately 55 claims involving 1,100 acres are present. The remaining portion of the area has low-unknown locatable mineral potential.

The entire area has low potential for leasable minerals and no leases or lease applications are present.

h. Cultural - The Cultural Resource Overview of the Twisp-Winthrop-Conconully Planning Unit (Bennett 1979) identified evidence of a narrow gauge road and a cabin in the area.

i. Land Use - The only authorized land use in the area is a Class E Road Permit for a road that runs from the Eightmile Road to a mining claim in T38N, R20E, Sec. 35.

j. Fire - This area has experienced 4 lightning and 1 human-caused fire for the period 1970-1979. This narrow band of land border the southern edge of the Pasayten Wilderness and is composed of south facing sparsely vegetated open rocky ridges with a few prominent mountain peaks. The role of fire within this area is slight and normal suppression action requires the use of aerial delivered fire fighters, such as smokejumpers.

Most wildfires that occur have a positive effect on most of the resident game and nongame wildlife species found within the area by creating new browse and by reducing the flammable concentrations of natural fuels that tend to accumulate when all wildfires are extinguised. The mountain goat population known to inhabit the area require fire to create favorable browse conditions on established summer and winter range areas.

The current fire suppression strategy is to confine all wildfires (USDA 1983). Confinement of wildfires, under the current management direction, is based on a least cost approach to fire suppression which recognizes the benefits of wildfire in certain ecosystems, but is not part of the decision process to allow wildfires to burn within a designated area. Containment and/or control will be applied when a wildfire has the potential to leave the area and/or the public and capital investments are threatened. Some lightning fires that leave the area and enter the wilderness may be permitted.

Application and use of unplanned ignitions (re. lightning and human-caused) to accomplish other resource objectives is not permitted under the current management direction.

k. Insects and Disease - During the past 5 years, low levels of mortality in lodgepole pine stands were observed during annual surveys. Mortality was caused by endemic populations of mountain pine beetle. During the late 1970's and early 1980's, Douglas-fir stands above Lost River and adjacent to Rattlesnake Creek were infested by western spruce budworm. Some top kill and mortality occurred. Existing stands of mature lodgepole pine are highly susceptible to mountain pine beetle. Dwarf mistletoes are common in Douglas-fir stands. Laminated root rot is known to occur in some stands, but the extent of the disease is not known.

l. Private Lands - There is no private land within the area and no known outstanding subsurface rights.

5. Need

a. Nearby Wilderness Areas - The area adjoins the Pasayten Wilderness and is approximately 20 air miles north of the Lake Chelan-Sawtooth Wilderness and approximately 25 air miles north of the Glacier Peak Wilderness on the Wenatchee National Forest.

b. Distance From Major Population Centers - The area is approximately 120 air miles northeast of Seattle and approximately 155 air miles northwest of Spokane.

c. Need for Ecosystem Representation - There are no unique ecosystems represented in the area. Ecosystems present are common throughout the area.

d. Proponent Interest, Public Input and Involvement - During the RARE II process, over 2,600 people expressed their preference for allocation of this area. Of these, 44 percent preferred wilderness with or without boundary adjustments, 2 percent preferred further planning with or without boundary adjustments and 54 percent preferred non-wilderness.

Approximately 750 people provided comments to the 1982 Draft Environmental Impact Statement for the Okanogan National Forest Plan. Of these, 46 percent expressed a preference that this area be allocated to wilderness.

The area was considered for wilderness designation during discussion of the 1984 Washington Wilderness Bill but was not designated.

6. Environmental Consequences

The following table shows the disposition of the area by management area by alternative.

TABLE C-27 Pasayten Rim Acres by Management Area by Alternative

Mgt. Area	Alternative A(Current Dir)	B	C	D	E	F	G	G(DEP)	H	I
	thousand acres									
1	-	-	-	15.4	-	-	8.5	8.5	-	-
4	-	15.4	11.6	-	15.4	15.4	-	-	-	13.7
5	15.4	-	-	-	-	-	4.5	4.5	-	-
10	-	-	3.8	-	-	-	2.4	2.4	2.4	-
14	-	-	-	-	-	-	-	-	13.0	-
18	-	-	-	-	-	-	-	-	-	1.7
Total	15.4									

a. Soils and Water - The relative rating of soil and water impacts is shown in the following table.

TABLE C-26 Pasayten Rim Soil and Water Impacts

Alt.	Riparian Areas (0-5 rating)	Mgt. Areas (0-10 rating)	Timber & Roads (0-13 rating)	Total
A	2	3	1	6
B	3	1	0	4
C	2	1	0	3
D	5	10	1	16
E	1	1	0	2
F	3	1	0	4
G	3	6	1	10
G(Depart)	3	6	1	10
H	3	7	1	11
I	3	1	0	4

No alternative would have a major impact on soil and water resources in the area because there would only be a small amount of timber harvest and road construction under any alternative.

b. Recreation - All alternatives would maintain all or most of the existing Semi-Primitive recreation opportunities available even though the alternatives vary in the type of management emphasis the area would receive. This is because with the limited amount of suitable timber land in the area few management activities would occur which detract from providing Semi-Primitive opportunities. No new trail construction would be required to provide access within the area.

c. Wilderness - All alternatives would maintain the option of future consideration of all or most of the area for wilderness through 2030. Small acreage reductions would occur in Alternatives A, D, G, G (Departure) and H by the year 2000 because of planned timber harvest activities. These activities would not greatly reduce minimum Wilderness requirements because of the areas proximimity to the Pasayten Wilderness.

d. Wildlife and Ecological - All alternatives except B, C, E, F and I would likely reduce the amount of mixed conifer old growth habitat. The most reduction would occur under Alternative A followed by D, G, G (Departure) and H.

All alternatives except B, C, E, F and I would likely reduce the snag habitat for cavity dwelling wildlife. The most reduction would occur under Alternative D followed by G, G (Departure), A and H.

Forest-wide standards and guidelines would adequately protect blue grouse wintering ridges and key habitats of other wildlife under all alternatives. No effect on threatened animal species would be expected under any alternative.

No effect on sensitive plant species would be expected under any alternative. Alternative I would establish a Botanical Area in the vicinity of Hart's Pass.

e. Range - Forage production would not change under any alternative.

f. Vegetation and Timber - Under all alternatives, mixed conifer stands would continue to be the principal forest vegetation.

Alternatives B, C, E, F and I would not permit timber harvest. These alternatives would retain the greatest inventory of salable volume and the greatest timber volume growth in the year 2000. Overall health and vigor of stands would decrease.

The overall health and vigor of timber stands would increase under all alternatives which permit timber management. Increases would not greatly vary.

Alternatives which permit timber management would result in approximately the same number of acres regenerated and replaced with seedlings and saplings by the year 2000.

Alternatives which permit timber management would retain approximately the same inventory of salable volume and timber volume growth rates in the year 2000.

Timber volume losses caused by animal damage would be approximately the same for all alternatives which permit timber management.

g. Minerals and Energy - All alternatives except A, D, G and H would maintain the lack of road access in the area. Alternatives A, D, G and H would increase access to known mineral areas having high potential for precious and base metals and tungsten. Cumulatively, Alternative D would provide the most access; followed by H, G and A.

h. Fire - Under all alternatives, the fire suppression strategy would be to confine all wildfires with the following exception. Wildfires which occur on areas managed for timber and range commodity production would be contained and/or controlled to protect these values.

All alternatives except B, C, E, F and I would slightly increase the fire hazard in the short-term from timber harvest activities. The risk of human-caused fire would slightly increase under all alternatives except B, C, E, F and I due to increased access over approximately 10% of the roadless area.

i. Insects and Disease - Alternatives A, D and H would reduce the probability of serious insect and disease outbreaks because timber stands would be managed.

Alternatives B, C, E, F, G, G (Departure) and I would not manage the timber stands in the area. Some mature stands of lodgepole pine are currently being attacked by mountain pine beetle. Volume losses in the remaining mature stands would be likely. Should beetle populations become epidemic, large volume losses in mature lodgepole pine and immature ponderosa pine in adjacent roaded areas would be likely.

Indemic disease outbreaks would result in some volume and growth loss. The magnitude of loss is not known.

LIBERTY BELL - 6026

112,430 Acres
34,479 Acres in North Cascades Scenic Highway
77,951 Acres outside North Cascades Scenic Highway

1. History

The area was originally inventoried as three separate roadless areas totalling approximately 157,900 acres during RARE I. The areas were Driveway Butte (6,900 acres), Liberty Bell (145,400 acres) and Canyon Creek (5,600 acres). The Liberty Bell area included lands on both sides of the North Cascades Highway. The areas were combined during RARE II except for that portion of the Liberty Bell area south of the North Cascades Highway which was included with the Sawtooth Roadless area. The RARE II process allocated the area to non-wilderness management. The Washington State Wilderness Act of 1984 designated approximately 34,500 acres as part of North Cascades Scenic Highway which permits management activities if the existing scenic values are maintained. The remaining portion of the area would be managed for Semi-Primitive Recreation or as Scenic Viewshed as per the allocations in the 1969 Winthrop Ranger District Multiple-Use Plan.

2. Description (Existing Conditions)

a. Location and Access - The area is located west of Winthrop in the west central portion of the Okanogan National Forest. Lands are located in Okanogan, Skagit, Whatcom and Chelan Counties. From Winthrop, access is provided over State Highway 20 and County and National Forest Roads in Lost River and Hart's Pass.

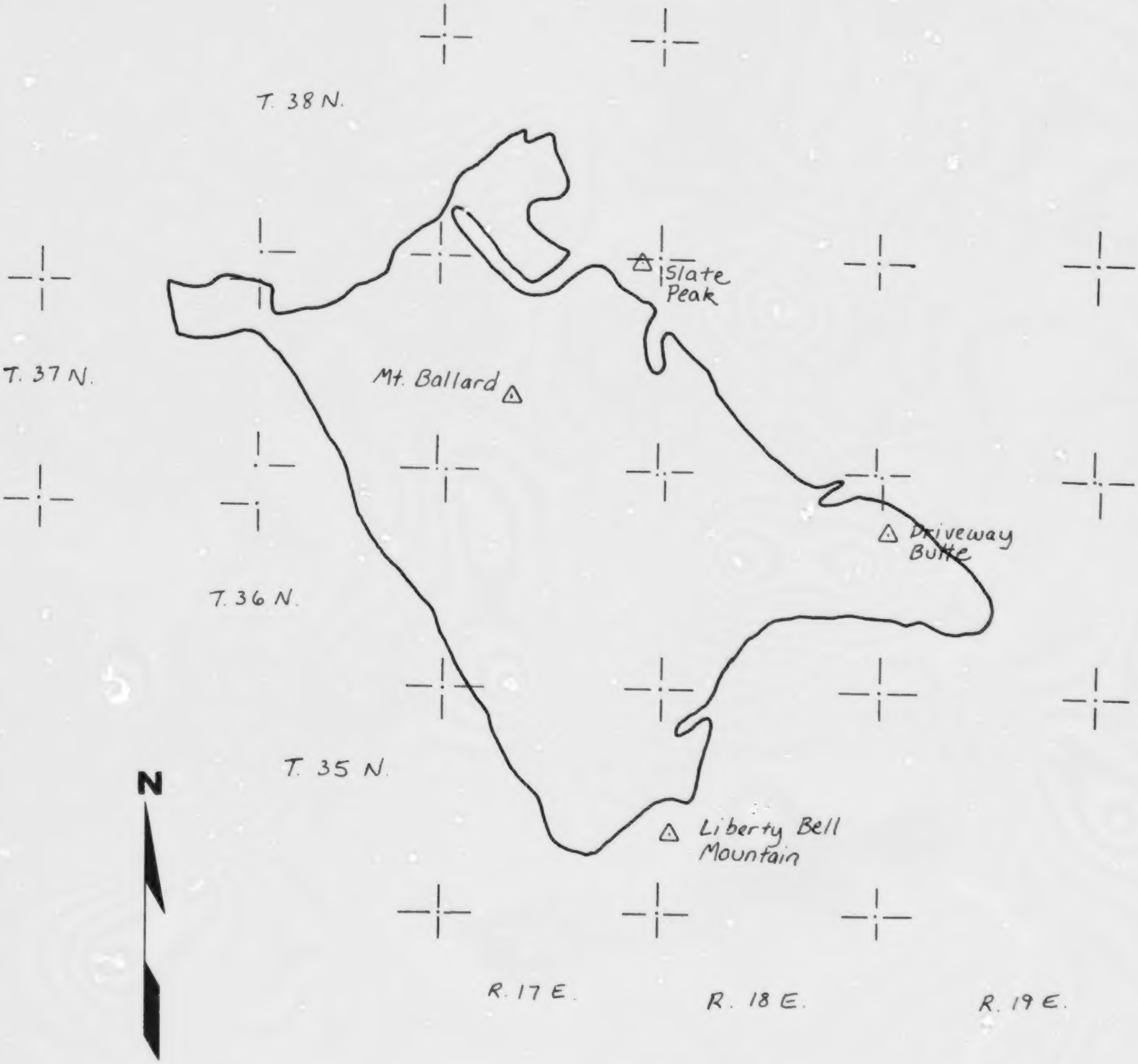
b. Topography - Much of the area is characterized by steep, rugged mountains with cirque basins, numerous avalanche tracks, high gradient streams and steep headwalls. Ridges are generally sharp or knife edged. Major valleys show the broad U-shape typical of glaciated valleys. Some permanent snowfields can be found. Elevations range from 1,800 feet on Ruby Creek to approximately 8,800 feet on Golden Horn Peak.

c. Soils and Soil Types - The area has been extensively glaciated. Soils are derived from granitic glacial till overlain with volcanic ash or pumice of varying thickness. Deposits of glacial outwash occur on valley floors. Organic material is common on the soil surface and is incorporated in deeper soils, commonly in the upper 20 inches.

Soils naturally covered with litter have low erosion hazards and are considered generally stable for management activities. Rilling and gullying occurs when water is concentrated on soils not covered with litter. Mass erosion hazard is moderate to very high. The hazard is greatest on north and east facing, oversteepened slopes.

FIGURE C-13

LIBERTY BELL
ROADLESS AREA (6026)


T. 38 N.
T. 37 N.
T. 36 N.
T. 35 N.
Slate Peak
Mt. Ballard
Driveway Butte
Liberty Bell Mountain
N
R. 17 E.
R. 18 E.
R. 19 E.

Scale 1/4" = 1 mile

281

d. Vegetation - High elevations coupled with shallow soils result in most of the area being in the Subalpine or Alpine Zones. Trees grow stunted and are widely scattered. Grass, shrubs and heather are the most common ground cover. Typical westside old growth fir stands can be found along Ruby Creek. A diverse variety of trees occur and include Douglas-fir, Engelmann spruce, Western red cedar, subalpine fir, mountain hemlock and Pacific silver fir at the higher elevations and ponderosa pine and lodgepole pine at the lower elevations.

e. Ecosystem Types - That portion of the area east of the Cascade Crest is considered spruce-fir forest and that portion west of the Cascade Crest is considered silver fir/ Douglas-fir forest using Bailey's classification. Under Kuchler's classification, the area is mapped as western spruce-fir forest.

3. Capability (Presence of Wilderness Characteristics)

a. Manageability and Boundaries - It would be difficult to manage the area as either an addition to the Pasayten Wilderness or as a separate wilderness. Adding this area to the Pasayten Wilderness would create a long protrusion from the existing boundary between the North Cascades Scenic Highway and the Hart's Pass Road. Although readily defined ridges could be used as boundaries on the southeast and southwest portions, placing the boundary on readily defined features on the northeast portion would greatly reduce the size of the area. These same factors affect the capability of managing the area as a separate wilderness.

b. Natural Integrity, Appearance and Surroundings - The area is generally free from evidence of human activity. The major impacts to the natural integrity and appearance of the area is the evidence of trails, helispots and past and present mining activity. Vegetation and topographic diversity is very different from most of the other roadless areas on the Okanogan National Forest but is similar to surrounding areas of the North Cascades Mountains.

c. Opportunities for Solitude, Primitive Recreation and Challenge - Opportunities for solitude range from low on the exterior of the area to high in the center more rugged portion of the area. Only the very center portion of the area provides primitive recreation opportunities based on distance from roads. However, the small acreage involved precludes management for primitive recreation opportunities. The opportunities for challenge range from low on the exterior portions to high on the steeper, more rugged topography.

4. Availability (Other Resource Potentials and Management Considerations)

a. **Recreation** - Most of the interior portion of the area provides Semi-Primitive Non-Motorized recreation opportunities. That portion of the area in the Canyon Creek and Mill Creek drainages provide Semi-Primitive Motorized opportunities. Those portions of the area adjacent to the North Cascades Scenic Highway and the Hart's Pass Road provide Roaded Natural opportunities. A portion of the area near Barron Creek is influenced by past mining activity and provides Roaded Modified opportunities. The primary recreation features are the spectacular scenery and geologic formations, and the high lakes and streams. Except for a few flat areas near the North Cascades Scenic Highway, the area does not lend itself to the establishment of significant developed sites.

Numerous trails provide access through the area including a portion of the Pacific Crest National Scenic Trail and one National Recreation Trail (Cutthroat Creek).

Recreation is the primary use of the area. Both the North Cascades Scenic Highway and the Pacific Crest National Scenic Trail have national reputations. Several mountain peaks challenge climbers. Recreation use is moderate to high throughout the area. Several outfitter-guides provide services including backpacking, horseback riding, hunting and helicopter assisted skiing.

b. **Wildlife** - A Federal and State listed threatened animal (*Urus arctos* - grizzly bear) and twelve State listed animals of special concern including two Forest Service sensitive species as indicated by * (*Felis lynx* - lynx, * *Gulo gulo* - wolverine, *Sciurus griseus* - western gray squirrel, * *Strix occidentalis* - spotted owl, *Picoides arcticus* - three-toed woodpecker, *Avicola richardsoni* - water vole,*Plebejus aquilo* - high mountain blue, *Boloria astarte* - Astarte's fritillary, *Lycaena cupreus* - lustrous copper, *Oeneis melissa* - Melissa's arctic, *Polygonia oreas* - Oreas anglewing and *Polites sonora* - Sonora skipper) have been reported to occur in or near the area (Washington State 1985). There have been no recent confirmed sightings of grizzly bear. Several areas of yearlong mountain goat habitat are included. From 3,000 to 5,000 acres of mixed conifer old growth are estimated to exist, providing some of the most productive habitat types for wildlife. Snag numbers for cavity dwellers are generally high. Numerous other wildlife common to the Forest inhabit the area.

c. **Water** - The major drainages from the area are the Methow River which is on the Nationwide Inventory of Wild and Scenic Rivers, Canyon Creek and Granite Creek. Canyon Creek and Granite Creek are large streams and contribute significant amounts of runoff to the Skagit River. Water quality is high year long. The major uses of water are for power production, irrigation and recreation.

There are no existing power withdrawals and no current Federal Energy Regulatory Commission (FERC) permits or licenses. In 1982, a request was filed with FERC for several exemptions to build a series of small hydro projects on Granite and Canyon Creeks. The request for exemptions was turned down by FERC. No application to FERC for a license or preliminary permit has been filed.

d. *Range* - There is no grazing permitted in this area.

e. *Ecological* - Seven State and Forest Service listed sensitive plants (*Agoseris elata* - tall agoseris, *Carex saxatillis* var. *major* - russet sedge, *Cryptogramma stelleri* - Steller's rock-brake, *Carex scirpoidea* var. *scirpoidea* - Canadian single-spike sedge, *Carex atrata* var. *erecta* - erect blackened sedge, *Draba aurea* - golden draba and *Poa grayana* - Gray's bluegrass) have been reported to occur in or near the area (Washington State 1985).

f. *Timber* - The area contains approximately 5,900 acres of suitable forest land. The majority of these lands support mature mixed conifer and lodgepole pine stands. Over 60 percent of the suitable land is classified as low productivity. There is approximately 7.6 million cubic feet (37.4 million board feet) of standing merchantable volume. Potential timber yield is approximately 1.1 million cubic feet (5.4 million board feet) per decade.

There are no timber sales planned in the area through 1989 on the current Timber Sale Plan.

g. *Minerals and Energy* - This area offers the greatest and most diversified mineral potential of any of the roadless areas on the National Forest. Approximately 26,400 acres has high, 29,000 acres has medium-high and 35,400 acres has medium-low locatable mineral potential. Twenty percent of the high, 7 percent of the medium-high, and 61 percent of the medium-low potential lands fall within the North Cascades Scenic Highway (NCSH). Numerous mines and prospects are found in the area, mainly in the high probability Tatie Peak-Barron and Canyon Creek-Azurite Pass areas, both within Slate Creek mining district. About $1.5 million worth of gold and silver were taken from various mines near Barron, between 1896 and 1963. Most of these mines lie just outside the area near its northeast corner. Close to $1 million dollars worth of gold and silver was produced from the Azurite Mine (1931-1939) and about $225,000 worth of placer gold from the Ruby and Canyon Creek areas. Exploration targets in the high and medium-high potential areas include precious and base metal veins and breccia bodies; large, low grade base and minor precious metal deposits; and tungsten occurrences. Medium-low probability areas offer favorable environments for uranium deposition. Approximately 140 unpatented mining claims, encompassing nearly 2,800 acres, and 10 patented mining claims involving 200 acres, are present within the area.

Although the potential for leasable minerals in the area is considered low, some 12,300 acres are currently under lease for oil and gas. The leases are situated near the area's northeast boundary, and are largely outside the NCSH.

h. Cultural - The Cultural Resource Overview of the Twisp-Winthrop-Conconully Planning Unit (Bennett 1979) identified evidence of numerous cabins and several lookouts and mines in the area.

i. Land Use - There are no authorized non-recreation land uses in the area.

j. Fire - The area has experienced 24 lightning and 21 human-caused fires for the period 1970-1979. The natural role of fire within this area varies from the true fir westside types where fire has been absent for 250-450 years to annual grass pine dominated communities where the fire cycle is around 10-15 years.

Changes in topography and elevation have a pronounce effect on the fire occurrence rate and ultimate size of any wildfire that occurrs within the area. Most of the conifer vegetation is isolated within the steep glaciated valleys that are separated by nonvegetated knife-edge ridges.

Direct suppression action over the majority of the area is limited to aerial delivered fire fighters, which includes helicopter personnel and smokejumpers. The overall cost of suppression compared against expected resource loss does not meet cost benefit criteria established for fire suppression activities.

The majority of the human-casued fires have occurred along the North Cross State Highway. All of these fires were abandoned campfires.

Most wildfires that occur within the area have a positive effect on most of the resident game and nongame wildlife species found within the area by creating new browse and by reducing the flammable concentrations of natural fuels that tend to accumulate when all wildfires are extinguised. The mountain goat population known to inhabit the area require fire to create favorable browse conditions on established summer and winter range areas.

The current fire suppression strategy is to confine all wildfires (USDA 1983). Confinement of wildfires, under the current management direction, is based on a least cost approach to fire suppression which recognizes the benefits of wildfire in certain ecosystems, but is not part of the decision process to allow wildfires to burn within a designated area. Containment and/or control will be applied when a wildfire has the potential to leave the roadless area and/or if the public and capital investments are threatened. Some lightning fires that leave the area and enter the Pasayten Wilderness may be permitted. An exception to the confinement fire strategy for the area is that control action will be taken on all human-caused fires that occur directly adjacent to the North Cross State Highway.

Application and use of unplanned ignitions (re. lightning and human-caused) to accomplish other resource objectives is not permitted under the current management direction.

k. Insects and Disease - During the past 5 years, low levels of mortality in lodgepole pine stands in the upper Methow River were observed during annual surveys. Mortality was caused by endemic populations of mountain pine beetle. Existing stands of mature lodgepole pine are highly susceptible to mountain pine beetle Standing snags from past bark beetle epidemics in western white pine and Englemann spruce are evident. Extensive areas of forested land were infested by western spruce budworm in the late 1970's and early 1980's. Top kill and mortality occurred. Dwarf mistletoes are common in Douglas-fir stands. The nature and extent of root rot diseases is not known.

l. Private Lands - There are approximately 200 acres of patented mining claims in the area. Most of this land has been heavily impacted by mineral activity.

5. Need

a. Nearby Wilderness Areas - The area adjoins the Pasayten Wilderness and the Ross Lake National Recreation Area. It is approximately 3 air miles north of the Lake Chelan-Sawtooth Wilderness, approximately 15 air miles north of the Glacier Peak Wilderness on the Wenatchee National Forest and approximately 3 air miles north of the North Cascades National Park.

b. Distance From Major Population Centers - The area is approximately 110 air miles northeast of Seattle and approximately 165 air miles northwest of Spokane.

c. Need for Ecosystem Representation - There are no unique ecosystems represented in the area. Ecosystems present are common throughout the area.

d. Proponent Interest, Public Input and Involvement - During the RARE II process, over 2,500 people expressed their preference for allocation of this area. Of these, 41 percent preferred wilderness with or without boundary adjustments, 2 percent preferred further planning with or without boundary adjustments and 57 percent preferred non-wilderness.

Approximately 750 people provided comments to the 1982 Draft Environmental Impact Statement for the Okanogan National Forest Plan. Of these, 46 percent expressed a preference that this area be allocated to wilderness.

The area was considered for wilderness designation during discussion of the 1984 Washington Wilderness Bill. Approximately 34,500 acres were designated as part of the North Cascades Scenic Highway and the remaining 77,900 acres were not designated.

6. Environmental Consequences

The following table shows the disposition of the area by management area by alternative.

TABLE C-27 Liberty Bell Acres by Management Area by Alternative

Mgt.	Alternative									
Area	A(Current Dir)	B	C	D	E	F	G	G(DEP)	H	I
	thousand acres									
1	-	-	-	77.9	-	-	-	-	-	-
4	68.3	64.9	68.1	-	77.9	77.9	63.5	63.5	-	77.9
4m	-	13.0	6.0	-	-	-	6.0	6.0	-	-
5	9.6	-	-	34.5	-	-	-	-	-	-
6	-	-	34.5	-	34.5	-	-	-	-	34.5
7	34.5	34.5	-	-	-	34.5	34.5	34.5	34.5	-
10	-	-	3.8	-	-	-	8.4	8.4	2.4	-
14	-	-	-	-	-	-	-	-	75.5	-
Total	112.5									

a. Soils and Water - The relative rating of soil and water impacts is shown in the following table.

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TABLE C-28 Liberty Bell Soil and Water Impacts

Alt.	Riparian Areas (0-5 rating)	Mgt. Areas (1-10 rating)	Timber & Roads (0-13 rating)	Total
A	2	1	0	3
B	3	1	0	4
C	2	2	0	4
D	5	8	0	13
E	1	1	0	2
F	3	1	0	4
G	3	1	0	4
G(Depart)	3	1	0	4
H	3	5	0	8
I	3	1	0	4

No alternative would have any impact on soil and water resources in the area.

b. Recreation - All alternatives would maintain all or most of the existing Semi-Primitive recreation opportunities available even though the alternatives vary in the type of management emphasis the area would receive. This is because with the limited amount of suitable timber land in the area few management activities would occur which detract from providing Semi-Primitive opportunities. Some new trail construction would be required to provide access within the area.

c. Wilderness - All alternatives would maintain the option of future consideration of all or most of the area for wilderness through 2030. Small acreage reductions would occur in Alternatives A, D, and H by the year 2030 because of planned timber harvest activities. These activities would not greatly reduce minimum wilderness requirements because of the size of the area.

d. Wildlife and Ecological - No change in wildlife habitat would be expected under any alternative.

Forestwide standards and guidelines would adequately protect key habitats of wildlife under all alternatives. No effect on threatened animal species would be expected under any alternative.

No effect on sensitive plant species would be expected under any alternative.

e. Range - No grazing allotments fall within this area.

f. Vegetation and Timber - Timber harvesting would not occur under any alternative by the year 2000. Timber management would only be permitted under Alternatives D and H.

Timber volume growth would essentially be the same under all alternatives.

Timber volume losses caused by animal damage under all alternatives would be minimal because the majority of the timber stands would be mature.

g. Minerals and Energy - All alternatives except D and H would maintain the lack of road access in the area. Alternative D would provide the greatest increase; followed by H.

Alternatives C, E and I would also withdraw the North Cascades Scenic Highway from mineral entry.

h. Fire - Under all alternatives except D and H the fire suppression strategy would be to confine all wildfires. An exception to the confinement strategy would be to control all human-caused fires that occur directly adjacent to the North Cascade Scenic Highway. Under alternatives D and H, the fire suppression strategy would be to contain and/or control all wildfires to protect the commercial forest land in the area for future timber management activities. This would occur even though timber harvest is not scheduled under these alternatives.

No alternative would change the fire hazard or risk in the area because of the lack of timber harvest and road construction.

i. Insects and Disease - Alternatives D and H would reduce the probability of serious insect and disease outbreaks because timber stands would be managed.

The remaining alternatives would not manage the timber stands in the area. Large acreages would remain susceptible to western spruce budworm. Infestations on unsuitable land would likely move into suitable lands in the North Cascades Scenic Highway with resulting mortality and top kill. Infestations of mountain pine beetle which presently occurs in both suitable and unsuitable stands may move into stands in the North Cascades Scenic Highway the the adjacent Pasayten Wilderness.

Endemic disease outbreaks would result in some volume loss. The magnitude of loss is not known.

SAWTOOTH - 6027

130,210 Acres
36,038 Acres in North Cascades Scenic Highway
94,172 Acres outside North Cascades Scenic Highway

1. History

The area was originally inventoried as six separate roadless areas totalling approximately 186,000 acres during RARE I. The areas were Lucky Jim (11,900 acres), Middle Creek (14,400 acres), Midnight Mountain (17,600 acres), Sawtooth (96,800 acres), Twisp River (30,800 acres) and Wolf Creek (14,500 acres). Between 1972 and 1979, timber sales and roads along with new roadless area inventory criteria reduced the total size of these areas by approximately 8,000 acres. The areas were combined during RARE II including that portion of the Liberty Bell area south of the North Cascades Highway. The RARE II process allocated the area to non-wilderness management. The Washington State Wilderness Act of 1984 designated approximately 36,000 acres as part of the North Cascades Scenic Highway and approximately 96,200 acres as part of the newly established Lake Chelan-Sawtooth Wilderness. That portion within the North Cascades Scenic Highway can have management activities if the existing scenic values are maintained. An additional 4,500 acres have been impacted by roads and logging since 1979. The remaining portion of the area would be managed for Semi-Primitive Recreation or Timber/Forage as per the allocations in the 1969 Winthrop and Twisp Ranger District Multiple-Use Plans.

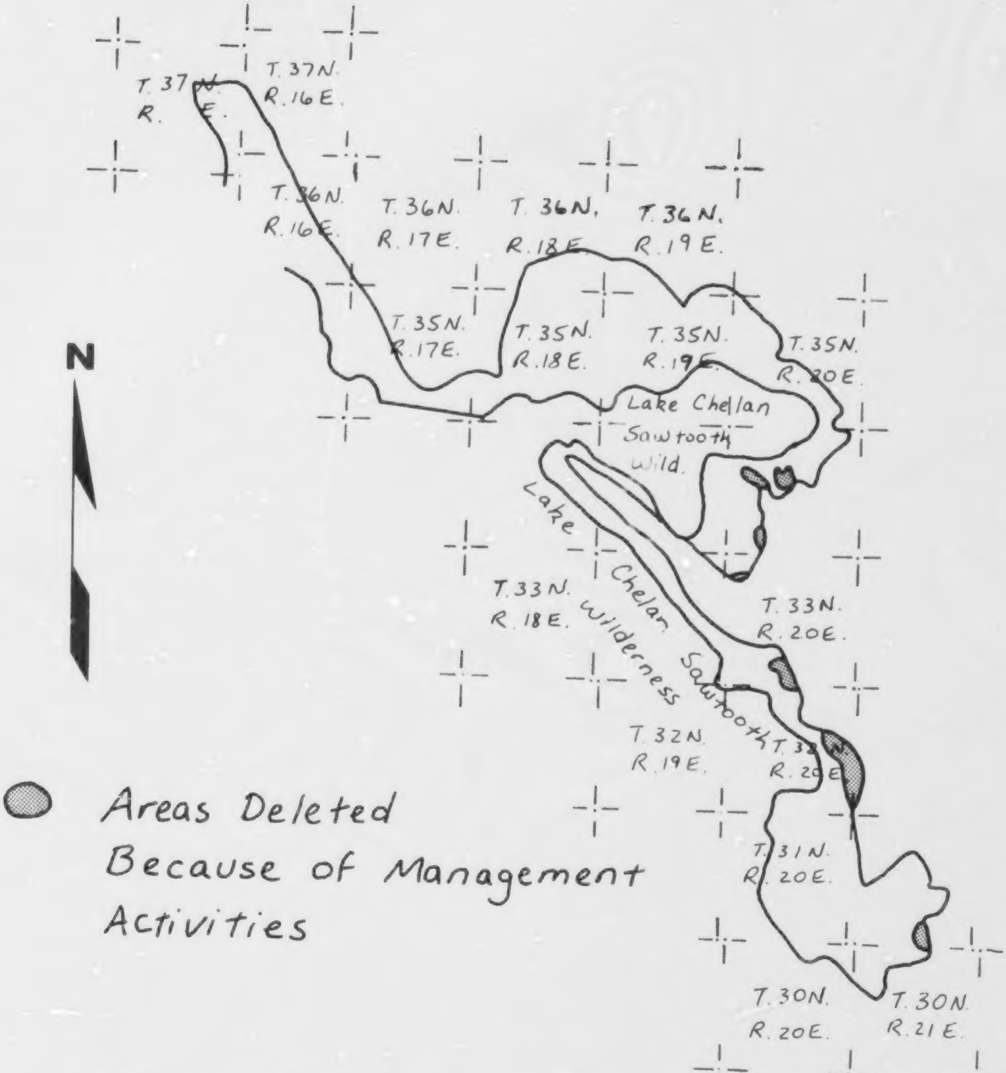
2. Description (Existing Conditions)

   a. Location and Access - The area is located from northwest to southwest of Twisp in the west portion of the Okanogan National Forest. The area consists of a moderate size block of land south of the Lake Chelan-Sawtooth Wilderness, strips of land along the lower elevations of the Lake Chelan-Sawtooth Wilderness and a moderate size block of land north and west of the Lake Chelan-Sawtooth Wilderness. Most lands are located in Okanogan County except for a small portion in the Washington Pass-Rainy Pass area which is located in Chelan County. From Twisp, access is provided over State Highways 20 and 153 and County and National Forest Roads in Cedar Creek, Wolf Creek, Bridge Creek, Twisp River, Buttermilk Creek, Libby Creek, North Fork Gold Creek, Crater Creek, Foggy Dew Creek and South Fork Gold Creek.

   b. Topography - The northern portion of the area consists of rugged mountains with deep valleys tracked by avalanche paths. Several cirque lakes dot the higher country. Sharp ridges divide major drainages. The southern portion of the area ranges from more gently rolling hills to deep V-shaped valleys and fairly sharp, well defined ridges. Outcrops of bedrock are common on steep southern slopes. Elevations

FIGURE C-14

SAWTOOTH ROADLESS AREA (6027)


N
T. 37N.
R. E.
T. 37N.
R. 16E.
T. 36N.
R. 16E.
T. 36N.
R. 17E.
T. 36N.
R. 18E.
T. 36N.
R. 19E.
T. 35N.
R. 17E.
T. 35N.
R. 18E.
T. 35N.
R. 19E.
T. 35N.
R. 20E.
Lake Chellan Sawtooth Wild.
Lake Chelan Sawtooth Wilderness
T. 33N.
R. 18E.
T. 33N.
R. 20E.
T. 32N.
R. 19E.
T. 32N.
R. 20E.
T. 31N.
R. 20E.
T. 30N.
R. 20E.
T. 30N.
R. 21E.

● Areas Deleted Because of Management Activities

Scale 1/8" = 1 mile

range from 2,400 feet to approximately 9,000 feet on Gardner Mountain.

c. Soils and Soil Types - Soils are derived from granitic glacial till overlain by volcanic ash or pumice of varying thickness. Granitic soils tend to occur on oversteepened, eroded slopes while finer textured soils occur on more gentle slopes where erosion has not stripped the ash or pumice away.

Trails passing through volcanic ash tend to be dusty when dry and slippery when wet. Heavy use tends to cause trail damage. Trails on granitic soils are better drained and more stable under extreme weather conditions. This is especially true at higher elevations.

Soils have a high erosion hazard when the vegetation cover is stripped away and water is concentrated. Especially susceptible are shallow soils on oversteepened slopes. Mass erosion hazards are low except in avalanche chutes and debris avalanche chutes where they are high. The impacts of failures can be expected to go off-site very quickly.

d. Vegetation - The great difference in elevation and precipitation contribute to a large array of inland vegetation with some evidence of coastal influence. Some mountain hemlock and Pacific silver fir can be found in the northern portion of the area. Open meadows and rocky slopes occur at higher elevations. Avalanche paths extending into the valley floors become a tangle of shrubs and broken trees. Good stands of old growth Douglas-fir and ponderosa pine occur. Some subalpine fir, Engelmann spruce, western red cedar and western white pine is present. Lodgepole pine covers a large part of the southern portion of the area. Shrubs occupy the lower southern facing slopes.

e. Ecosystem Types - That portion of the area east of the Cascade Crest is considered spruce-fir forest and that portion west of the Cascade Crest is considered silver fir/Douglas-fir forest using Bailey's classification. Under Kuchler's classification approximately 35 percent of the area is mapped as Douglas-fir forest and the remaining 65 percent is mapped as western spruce-fir forest.

3. Capability (Presence of Wilderness Characteristics)

a. Manageability and Boundaries - All portions of the area could be added to the Lake Chelan-Sawtooth Wilderness but would relocate boundaries from generally readily defined ridges (except in the Twisp River area) to not readily defined features such as contour lines, which would affect the capability of being able to manage these additions as wilderness. In addition, a narrow finger of wilderness would be created between the North Cascades Scenic Highway and North Cascades National Park.

b. Natural Integrity, Appearance and Surroundings - Much of the area gives the appearance of being changed primarily by the forces of nature and offers spectacular scenery and geologic formations. The major impacts on the natural integrity and appearance of the area is the evidence of heavily used camp spots, helispots and old mine workings. Although vegetation and topographic diversity is different than that found in the most other Roadless Areas on the Okanogan National Forest, it is similar to that found in surrounding areas of the Lake Chelan-Sawtooth Wilderness.

c. Opportunities for Solitude, Primitive Recreation and Challenge - Opportunities for solitude are generally low throughout the area except for in the Cedar Creek Area. Primitive recreation opportunities are lacking because only a small portion of area in the Cedar Creek drainage is over three miles from a road or trail open to motorized vehicles. Opportunities for challenge range from low on the exterior portions of the area to high on the more rugged portions.

4. Availability (Other Resource Potentials and Management Considerations)

a. Recreation - Semi-Primitive recreation opportunities were fragmented with the passage of The Washington Wilderness Act of 1984. The most significant acreage of Semi-Primitive, Non-Motorized opportunities are located between the North Cascades Scenic Highway and North Cascades National Park, and in the Upper Cedar Creek, Little Boulder Creek, Upper Bridge Creek, Scaffold Creek, Crater Creek and Middle Fork Gold Creek drainages. Most of these areas are adjacent to the Lake Chelan-Sawtooth Wilderness. Semi-Primitive Motorized recreation opportunities are provided along Cedar Creek and in the Foggy Dew, Martin Creek and Eagle Creek drainages. The remaining portion of the area provides Roaded Natural opportunities. The primary recreation features are the spectacular scenery and geologic formations (especially Liberty Bell and Early Winters Spires) and the high elevation lakes and streams. Except for that portion of the area near Sandy Butte, which is capable of providing for major downhill skiing opportunities, and a few flat areas near the North Cascades Scenic Highway; the area does not lend itself to the establishment of significant developed sites.

Many trails pass through the area and provide access to the Lake Chelan-Sawtooth Wilderness, Wenatchee National Forest and North Cascades National Park. This includes the Eagle

Lake, Blue Lake and Cedar Creek National Recreation Trails. Approximately 22 miles of trail open to motorized vehicles in the Foggy Dew-Crater Creek area has been reconstructed with State of Washington Off-Road Vehicle funds. These trails provide some of the best off-road vehicle opportunities in an unroaded setting in Eastern Washington.

Recreation is the primary use in the area. The North Cascades National Scenic Highway has a national reputation and the Sawtooth Range has a statewide repetation. The Liberty Bell and Early Winters Spires areas challenge climbers. Use levels throughout the area are moderate to high especially on trails and around lakes. Several outfitter-guides provide services including backpacking, horseback riding, mountain climbing, hunting and helicopter assisted skiing.

b. *Wildlife* - A Federal and State listed threatened animal (*Ursus arctos* - grizzly bear) and eight State listed animal species of special concern including two Forest Service sensitive species as indicated by * (*Felis lynx* - lynx, *Martes americana* - marten, * *Gulo gulo* - wolverine, * *Strix occidentalis* - spotted owl, *Plebejus aquilo* - high mountain blue, *Boloria astarte* - Astarte's fritillary, *Pyrgus centaureae* - alpine checkered skipper and *Oeneis melissa* - Melissa's arctic) are reported to occur in or near the area (Washington State 1985). There have been no recent confirmed sightings of grizzly bear. Several areas of yearlong mountain goat habitat are included. About 3,200 acres are in low density winter range, where both mule and white-tailed deer tend to concentrate. Here dense conifers, which provide protection from both deep snow and cold, and available forage are vital to these herds. From 8,000 to 11,000 acres of mixed conifer old growth are estimated to exist, providing some of the most productive habitat types for wildlife. Snag numbers for cavity dwellers are generally high. Numerous other wildlife common to the Forest inhabit the area.

c. *Water* - High quality water drains from the area. The watershed draining this area provides the major portion of the Twisp River runoff and makes important runoff contributions to the Methow River which is on the Nationwide Inventory of Wild and Scenic Rivers. Runoff is largely from snowmelt. Peak flows occur during May and early June. Summer thunderstorms may cause streams to rise for a few hours depending on the intensity of the storm. Water from the area is used for limited domestic consumption, irrigation, recreation and stockwater purposes.

There are no existing power withdrawals, proposed impoundments or known Federal Energy Regulatory Commission permits or licenses.

d. Range - The area includes portions of the Rainy Creek Unit of Hunter-McFarland, Wolf, and Little Bridge Cattle Allotments and the Buttermilk Sheep Allotment. Approximately 50 percent of the Rainy Creek Unit, 35 percent of the Wolf Allotment, 30 percent of the Little Bridge Allotment and 40 percent of the Buttermilk Allotment are classified as suitable for grazing.

The Rainy Creek Unit is managed with a varying season/ alternate year system of grazing. Wolf Creek is under a Coordinated Resource Plan with rest rotation grazing. Little Bridge is managed under a five pasture rest-rotation grazing system. Buttermilk is used by 1,200 sheep on alternate years. On the approximately 26,461 acres of suitable range there is about 1500 animal unit months of forage removed.

e. Ecological - Five State and Forest Service listed sensitive plants (*Cryptogramma stelleri* - Steller's rockbrake, *Eritrichium nanum* var. *elongatum* - pale alpine-forget-me-not, *Mimulus suksdorfii* - Suksdorf's monkey-flower, *Parnassia kotzebuei* - Kotzebue's grass-of-Parnassus and *Saxifraga debilis* - pygmy saxifrage) are reported to occur in or near this area (Washington State 1985).

f. Timber - The area contains approximately 35,900 acres of suitable forest land. The majority of these lands support mature mixed conifer and lodgepole pine stands. There is approximately 62.1 million cubic feet (307.5 million board feet) of standing merchantable volume. Potential timber yield is approximately 11.9 million cubic feet (59 million board feet) per decade.

There are no timber sales planned in the area during 1986 on the current Timber Sale Plan. A major portion of 1 sale with a volume of 6.7 million board feet is planned in 1989.

g. Minerals and Energy - This area offers diverse minerals potential. Embraced in the area are approximately 8,000 acres having high potential for locatable exploration and development, 35,000 acres of medium-high, and 44,000 acres of medium-low mineral potential. Probable exploration targets include high grade copper, tungsten, and gold/silver veins; large, low grade base and precious metal deposits; possible volcanogenic massive sulfide deposits; and uranium and pumicite occurrences. Approximately 45 mining claims are present in the area. These are only a few of the nearly 600 mining claims located in the Twisp and Wolf Creek drainages, most of which fall within the Lake Chelan-Sawtooth Wilderness. Gold exploration and development in this, the Twisp mining district, began in the 1880's. A small amount of gold-silver ore was produced in 1939 or 1940 but little additional development was completed. Only a few dozen claims were present in the area until 1983 and 1984 when two large groups of lode claims were recorded. Approximately 70 percent of the high, 20 percent of the medium-high, and 50 percent of the medium-low mineral potential areas lie within the North Cascades Scenic Highway.

Although the potential for leasable minerals in the area is considered low, some 4,800 acres have been leased or are under lease application for oil and gas.

h. Cultural - The Cultural Resource Overview of the Twisp-Winthrop-Conconully Planning Unit (Bennett 1979) identified evidence of several cabins, a lookout and a fossil deposit in the area.

i. Land Use - The only authorized non-recreation land uses in the area are two Class E Road Permits for portions of the North Creek and Twisp Pass trails which access mineral claims.

j. Fire - This area has experienced 40 lightning and 10 human-caused fires for the period 1970-1979.

The overall fire frequency and impact from past fires is quite low due to the sparce nature of the vegetation found above 5,000 feet in elevation. The vegetative communities below 5,000 feet have sustained the majority of the lightning and person-caused fires.

The communities most affected by past wildfires are lodgepole pine and those affected the least are the true fir-old growth types found within the northern portion of the area.

Most wildfires that occur within the area have a positive effect on most of the resident game and nongame wildlife species found within the area by creating new browse and by reducing the flammable concentrations of natural fuels that tend to accumulate when all wildfires are extinguised. The mountain goat population known to inhabit the area require fire to create favorable browse conditions on established summer and winter range areas.

The current fire suppression strategy is to confine all wildfires (USDA 1983). Confinement of wildfires, under the current management direction, is based on a least cost approach to fire suppression which recognizes the benefits of wildfire in certain ecosystems, but is not part of the decision process to allow wildfires to burn within a designated area. Containment and/or control will be applied when a wildfire has the potential to leave the area and/or the public and capital investments are threatened. Some lightning fires that leave the area and enter the Lake Chelan-Sawtooth Wilderness and North Cascades National Park may be permitted. An exception to the confinement fire strategy for the area is that a control action will be taken on all human-caused fires that occur directly adjacent to the North Cross State Highway.

Application and use of unplanned ignitions (re. lightning and human-caused) to accomplish other resource objectives is not permitted under the current management direction.

k. Insects and Disease - During the past 5 years, low levels of mortality in lodgepole pine and ponderosa pine were observed during annual surveys. Mortality was caused by endemic populations of western pine beetle and mountain pine beetle. During the late 1970's and early 1980's extensive areas were infested by the western spruce budworm. Top killing and mortality occurred in many infested stands. Dwarf mistletoes are common in Douglas-fir stands. The nature and extent of root rot diseases is not known.

l. Private Lands - There is no private land within the area and no known outstanding subsurface rights.

5. Need

a. Nearby Wilderness Areas - The area adjoins the Lake Chelan-Sawtooth Wilderness and the northern portion adjoins the North Cascades National Park. Portions of the area are approximately 10 air miles south of the Pasayten Wilderness and approximately 12 air miles north and east of the Glacier Peak Wilderness on the Wenatchee National Forest.

b. Distance From Major Population Centers - The area is approximately 115 air miles northeast of Seattle and approximately 140 air miles northwest of Spokane.

c. Need for Ecosystem Representation - The 150-acre Wolf Creek Research Natural Area (RNA) is located within the area and provides an example of the bitterbrush/bunchgrass community. In addition, other communities are represented within the RNA.

d. Proponent Interest, Public Input and Involvement - During the RARE II process, approximately 2,900 people expressed their preference for allocation of this area. Of these, 42 percent preferred wilderness with or without boundary adjustments, 2 percent preferred further planning with or without boundary adjustments and 56 percent preferred non-wilderness.

Approximately 750 people provided comments to the 1982 Draft Environmental Impact Statement for the Okanogan National Forest Plan. Of these, 61 percent expressed a preference that this area be allocated to wilderness.

The area was considered for wilderness designation during discussion of the 1984 Washington Wilderness Bill. Approximately 96,200 acres were designated as part of the Lake

Chelan-Sawtooth Wilderness and approximately 36,000 acres as part of the North Cascades Scenic Highway. The remaining 94,172 acres were not designated.

6. Environmental Consequences

The following table shows the disposition of the area by management area by alternative.

TABLE C-29 Sawtooth Acres by Management Area by Alternative

Mgt. Area	Alternative									
	A(Current Dir)	B	C	D	E	F	G	G(DEP)	H	I
	thousand acres									
1	-	53.0	-	74.2	-	58.7	33.5	33.5	-	-
4	16.3	16.5	69.9	-	71.3	12.3	21.1	21.1	-	94.0
4m	17.4	13.0	22.7	-	22.7	20.0	11.4	11.4	-	-
5	60.3	6.5	-	56.0	-	-	22.5	22.5	-	-
6	-	-	36.2	-	36.2	-	-	-	-	36.2
7	36.2	36.2	-	-	-	36.2	36.2	36.2	36.2	-
8	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
9	-	-	-	-	-	3.0	-	-	4.6	-
10	-	-	1.4	-	-	-	4.2	4.2	4.2	-
14	-	5.0	-	-	-	-	1.3	1.3	85.2	-
Total	130.3									

a. Soils and Water - The relative rating of soil and water impacts is shown in the following table.

TABLE C-30 Sawtooth Soil and Water Impacts

Alt.	Riparian Areas (0-5 rating)	Mgt. Areas (0-10 rating)	Timber & Roads (0-13 rating)	Total
A	2	2	4	8
B	3	3	6	12
C	2	1	0	3
D	5	7	8	20
E	1	1	0	2
F	3	3	6	12
G	3	3	5	11
G(Depart)	3	3	5	11
H	3	5	5	13
I	3	1	0	4

Cumulatively, Alternative D would have the most impact on soil and water resources in the area; followed by the remaining alternatives.

Soil compaction would increase in Alternative D from the large amount of timber harvest. The remaining alternatives would not increase soil compaction. Increased soil compaction would reduce vegetative growth and establishment. Soil water infiltration rates would be reduced and surface soil erosion could increase. Soil ripping of landings and heavily used skid trails after logging operations would reduce the potential impacts. The probability of this practice working is very high.

Stream sediment would increase the most in Alternative D because of the high levels of road construction and timber harvest. The other alternatives would have little to no effect on stream sedimentation because few roads would be constructed. The other alternatives would not cause major stream sedimentation increases although there might be temporary load increases in small drainages where new roads were constructed. Stream sediment load increases in Alternative D could reduce the water's utility. Irrigation could be made more expensive because siltation in irrigation canals would increase maintenance costs, decrease the amount of water flow and plug irrigation water sprinklers. Domestic water uses would be more expensive because water filtration would be required.

Alternative D would slightly increase stream water temperature. A slight increase in water temperature would be benefical to the fisheries resource. Higher water temperatures would not decrease the water's capability to be used in irrigation. Domestic water use may be slightly affected because some people have developed a taste for water at a specific temperature.

b. Recreation -Cumulatively, all alternatives except C, E and I would reduce the amount of area providing Semi-Primitive recreation opportunities and increase the amount of area providing Roaded Natural and Roaded Modified recreation opportunities. Alternatives A, B, F, G and G (Departure) would provide Semi-Primitive opportunities in the Cedar Creek Foggy Dew, Martin Creek and Eagle Creek drainages. Some new trail construction would be required to provide access within the area.

Alternatives A, G and G (Departure) would provide Roaded Natural opportunities on most portions of the area not managed for Semi-Primitive recreation opportunities. Alternatives B and F would provide mostly Roaded Modified opportunities on those portions of the area not managed for Semi-Primitive recreation opportunities. Alternatives D and H would provide Roaded Modified opportunities over almost the entire area.

c. Wilderness - Alternatives C, E and I would maintain the option of future consideration of the area for Wilderness through 2030.

Alternatives A, B, F, G and G (Departure) would maintain the option of future consideration of a major portion of the area for wilderness through 2030.

Alternatives D and H would remove the area from future consideration as wilderness by 2030.

All alternatives except C, E and I would reduce the amount of area available for Wilderness consideration in the year 2000. Cumulatively, the most reduction would occur in Alternative D followed by F, B, H, G (Departure), G and A.

d. Wildlife and Ecological - All alternatives except C, E and I would modify deer range cover. Modifications would be greatest under Alternative D followed by B, A, F, H, G (Departure) and G. Timber harvest in all alternatives except A, B, and D would be designed to perpetuate or improve winter range habitat values.

Alternatives A, B and D would not emphasize deer habitat and would most likely decrease winter range habitat values.

All alternatives except C, E and I would likely reduce the amount of mixed conifer old growth habitat.The most reduction would occur under Alternative A followed by D, F, B, G (Departure), G and H.

All alternatives except C, E, and I would reduce the snag habitat for cavity dwelling wildlife. The most reduction would occur under Alternative D followed by B, F, A, G (Departure), H and G.

Forestwide standards and guidelines would adequately protect blue grouse wintering ridges and key habitats of other wildlife under all alterntives. No effect on threatened animal species would be expected under any alternative.

No effect on sensitive plant species would be expected under any alternative.

e. Range - Forage production would not change under alternatives C, E, G and I. Alternative D would increase forage production by about 50 percent. All other alternatives would increase production slightly.

f. Vegetation and Timber - Under all alternatives, mixed conifer stands would continue to be the principal forest vegetation.

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Alternatives C, E and I would not permit timber harvest. These alternatives would retain the greatest inventory of salable volume and the greatest timber volume growth in the year 2000. Overall health and vigor of stands would decrease.

The overall health and vigor of timber stands would increase under all alternatives which permit timber management. The greatest increase in overall health would occur under Alternative D.

Under alternatives which permit timber management, Alternative D followed by F would result in the largest number of acres regenerated and replaced with seedlings and saplings by the year 2000. Alternatives A and G would result in the least acres regenerated to seedlings and saplings.

Alternatives B and D would retain the smallest inventory of salable volume in the year 2000. Alternative D would have the least volume growth in the year 2000. The lower volume growth would occur because seedlings and saplings would not yet be large enough to produce merchantable volume.

Timber volume losses caused by animal damage would increase in proportion to the acres of mature timber stands regenerated to seedlings and saplings.

g. Minerals and Energy - All alternatives except C, E and I would increase accessibility to some known mineral areas. Cumulatively, Alternatives D and H would provide the greatest increase; while Alternatives A, B, F and G would provide a substantially less increase. Only Alternatives D and G would allocate more than 35 percent of the area to low or moderately restrictive management areas. Alternatives C, E and I would maintain the lack of road access.

Alternatives C, E and I would also withdraw the North Cascades Scenic Highway from mineral entry.

h. Fire - Under all alternatives except D the fire suppression strategy over a portion of the area would be to confine all wildfires based on a least cost approach to fire suppression. An exception to the confinement strategy would be to control all human-caused fires that occur directly adjacent to the North Cascades Scenic Highway. Alternatives C, E, G, G(Departure) and I would allow the greatest use of the confinement strategy due to the amount of land allocated to Semi-Primitive Recreation and North Cascades Scenic Highway management strategies. On those areas managed under a confinement strategy, containment and/or control action would be applied to all wildfires that have the potential to leave the area, are a threat to the public and capital investment, or does not meet the specific fire managment direction identified within the area. Under Alternative D, the fire suppression strategy would be to contain and/or control all wildfires to protect commercial forest land in the area.

All alternatives except C, E and I would increase the fire hazard in the short-term from timber harvest activities. Cumulatively, timber management, including the use of prescribed fire, would increase vegetative diversity and reduce overall fire hazard by treating natural fuels within previously unmanaged timber stands. The risk of human-caused fire would increase under all alternatives, except C, E and I, because of increased road access.

i. Insects and Disease - Alternatives D and H would reduce the probability of serious insect and disease outbreaks because timber stands would be managed.

The remaining alternatives would not manage the timber stands in the area. Current infestations of mountain pine beetle would continue. Should mountain pine beetle populations become epidemic, volume losses within the area and in adjacent roadless and roaded areas would be high.

Mixed conifer stands would remain susceptible to western spruce budworm. A major outbreak of western spruce budworm would result in high volume losses.

Indemic disease outbreaks would result in some volume loss. The magnitude of loss is not known.

APPENDIX D - EIS

Biological Evaluation for Federally Classified Species

Grizzly Bear - threatened

History of grizzly bear occurrence

Recent review of available records (Washington Department of Game, US Fish and Wildlife Service, National Park Service and Forest Service sources) indicates that grizzly bears have existed in the past and may possibly be present now, at least occasionally. Recent reports of possible grizzly sightings have not been verified.

Areas of possible occupancy

If present, grizzly bear occurrence is most likely in the northwest portion of the Okanogan National Forest. Most of the area is both rugged and remote. Most of the land is in classified areas, either wilderness or scenic highway.

Surveys to ascertain grizzly bear occupancy and potential of the habitat to support viable numbers are needed.

Evidence of effects to grizzly bear

Human - grizzly interactions, conflicts and problems are not apparent. Human activities such as hiking, camping, hunting and livestock grazing are common in the area of possible grizzly occupancy.

Potential for future conflict or effect

In all alternatives activities, roading and vegetative management are not expected to change appreciably in the area of possible grizzly bear occupancy. Therefore, no effect to this species is expected. In the event of unexpected and unpredictable activities of concern (e.g., mineral, gas or oil exploration or development), a re-evaluation of all that is known to date will be made. If additional data is necessary, surveys will be conducted by project proponent or Forest Service as appropriate prior to proceeding with project of concern.

Bald Eagle - threatened

Area of occupancy

Bald eagles are commonly seen along the river courses in Okanogan County during winters of open (unfrozen) water. During these times, bald eagles are occasionally seen flying over or feeding on rabbit or deer carcasses on nearby, low elevation Forest Service lands.

Occasional sightings are also reported during the spring and summer. No nesting is known to have ever occurred on Okanogan National Forest according to Washington Department of Game, US Fish and Wildlife Service and Forest Service records. Spring-summer sightings have been investigated to ascertain possible nesting attempts and no evidence has been found to date.

Existing and potential effects to bald eagles

Management of the Okanogan National Forest apparently has minor impact on migrating bald eagles, even though prey species are occasionally taken. Management of deer winter ranges in any alternative will assure that a prey base is available from Forest lands adjacent to areas of primary eagle habitation.

Opportunities to enhance low-elevation, untimbered lands with raptor perch structures, for example, could be accomplished in any alternative. Protection measures would also be applied uniformly in each alternative if nesting or other potential habitat needs are discovered.

APPENDIX E

SOIL AND WATER PROJECT DESIGN CONSIDERATIONS

FILTER STRIPS

Roads should not be located in or adjacent to stream channels. Road construction in such sites increases erosion, sedimentation and deterioration of water quality. Roads should be located far enough upslope to prevent transport of sediment into stream channels. Wherever possible, a filter belt of undisturbed vegetation should be maintained between roads and stream channels to slow runoff, facilitate infiltration and filter out sediments. The width of the belt depends upon precipitation, vegetation, soils and slope steepness (Table E-1).

Good filter strip effectiveness is found in areas with undulating slope, soils with rapid infiltration rates and significant surface litter or debris. Long, continuous slopes with soils having slow water infiltration rates and sparse surface vegetation are poor filter strips (Figure E-1).

TABLE E-1 Recommended filter strip widths for various hillslope gradients and filter strip quality. Providing filter strips of these widths can be expected to intercept approximately 80-90 percent of transported sediment.

Hillslope Gradient percent	Optimum 1/ Filter Strip Conditions (feet)	Sub-optimum 1/ Filter Strip Conditions (feet)
0	25 2/	50 3/
10	45	90
20	65	130
30	85	170
40	105	210
50	125	250
60	145	290
70	165	330

1/ See Figure E-1.

2/ Based on Trimble and Sartz 1957, using the equation FSW (feet) = 25 + [2 x hillslope gradient (%)]

3/ Based on Darrach, Sauerwein and Holly, 1981, using the equation FSW (feet) = 50 + [4 x hillslope gradient (%)]

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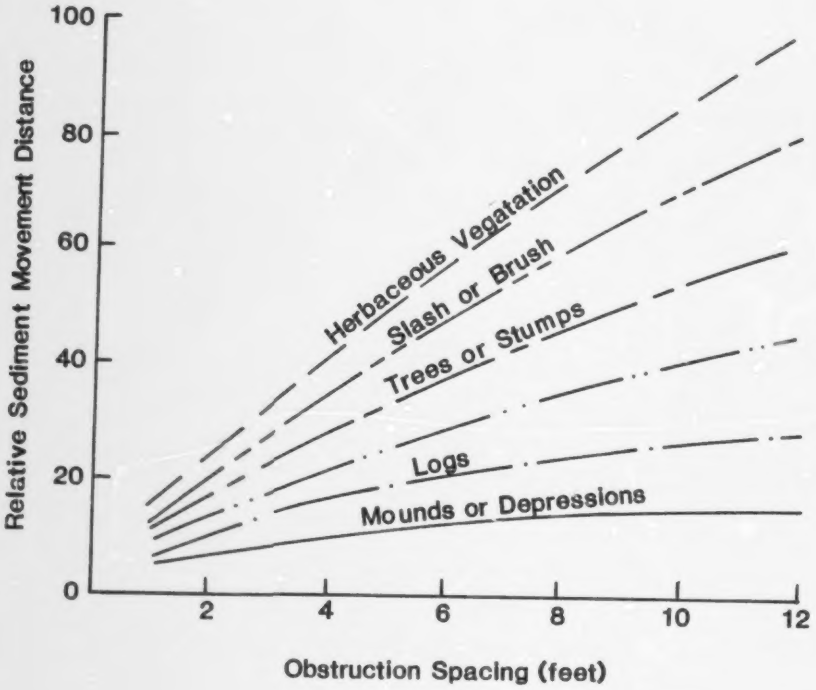
FIGURE E-1 Relative effectiveness of different soil surface vegetation and debris to effectively trap transported sediment.

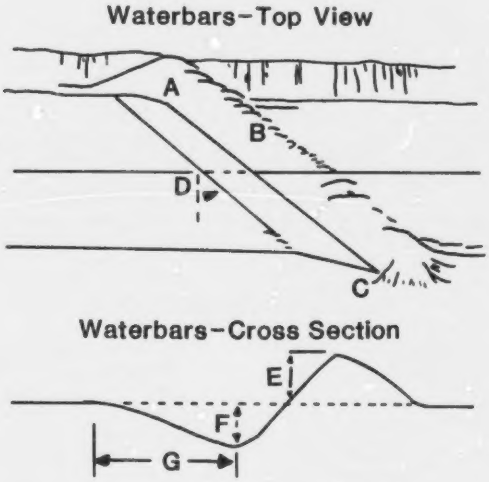


ROAD DRAINAGE TECHNIQUES

Waterbars

Waterbars (Figure E-2) can be used for drainage on closed roads and skid trails. They are similar to cross ditches, but less expensive and less exciting to construct. Waterbars are not suitable for use on roads which receive any appreciable amount of vehicle traffic as the water berm soon breaks down and the effectiveness of the structure is lost.

FIGURE E-2 Waterbar construction specifications.



A Bank tie-in point cut 6 inches to 1 foot into roadbed.
B Cross drain berm height 1 to 2 feet above the roadbed.
C Drain outlet cut 8 inches to 16 inches into roadbed.
Angle drain 30 to 45 degrees downgrade with road centerline, **D**.
F Up to 2 feet in height.
F Depth to 18 inches.
G 3 tp 4 feet.
Remember energy dissipator, waterspreaders.

Culverts

Culverts are the most frequently used cross drain structures. For heavily used roads, corrugated metal pipe culverts are the best facility since they are not disturbed by vehicles. Initial installation costs are higher than other cross drain structures but maintenance is low even on high- use roads.

Culverts should be installed in the direction of natural flow, and the culvert grade should be slightly higher than the natural flow line of water. If the grade is too low, the culvert partially fills with sediment, and capacity is reduced. If too high, ponding upstream and damage to the roadway embankment could result. The following diagrams demonstrate correct and incorrect methods of culvert installation. Culvert outlets should be provided with aprons of rock or resistant material to reduce the energy of outflow. For prevention of erosion on large fills, aprons and downspouts may be necessary to transport water over unstable soil materials.

The Forest Engineer has specifications for installation of culverts of varying types and sizes.

STREAM CROSSINGS

Almost every timber sale or road building operation in mountainous terrain will require some stream crossings. Each crossing must be designed to meet two criteria: (1) the structure must be large enough to pass the maximum volume of water that will occur within its designed life, and (2) they must be located so existing water quality is not seriously altered.

Channel crossings are sensitive from a sediment production standpoint. Structures too small for peak flows produce sediment by: (1) backing water behind the structure until the fill is saturated, causing failure; (2) overflowing the culvert, washing out the structure; or (3) increasing the water velocity in the culvert, causing accelerated erosion on the downstream end. Poorly located structures that do not conform to the constraints of the stream channel result in the same sediment-producing situations. Water flow into the structure is smooth, and erosion of the roadbed results.

Crossing locations should be determined early in the road planning process. The road system should adapt to crossing locations so structures can be designed and located for maximum stability and efficiency.

Straight channel sections are good structure locations. The water should flow directly into the structure. Any deflection of the water from bank to bank causes scour and leads to structure failure. Stream meanders are very poor spots for crossing locations. Also, channels with deposition bars indicate frequent shifts in the direction of flow and should be avoided. Low stream velocity is important for a stable crossing site. Lower velocities have less effect on the structure and adjoining banks.

Bank conditions are also important. Locating structures in stream reaches with more resistant banks means a greater chance for success even though initial construction costs may be higher.

A stream crossing structure should minimize stream flow patterns. There will always be a response to an alteration in some part of the channel. For example, if a structure constricts flow, higher velocities increase the water's energy, eroding the slope below the structure. The velocity must be reduced until it is the same as before the structure altered it, or increased channel scour and sedimentation will occur. Besides velocity increases, a constricting structure causes ponding at its inlet. Much of the stream's sediment load is deposited, blocking the structure's entrance.

Roads should climb away from channel crossings for a short distance in both directions to prevent the road from being a new channel. The lowest point in the road should not be directly over the crossing structure to reduce direct discharge of road runoff into the stream.

Types of Stream Crossings

There are three general methods for crossing live streams: fords, culverts and bridges. The method depends upon traffic requirements, hydrologic-hydraulic requirements, resource management needs and aesthetics. Factors influencing the selection of an appropriate crossing method include stream size, debris potential, fisheries values, avalanche paths, foundation conditions, construction and maintenance costs, equipment and material availability, and the planned road use and service life.

CULVERT DESIGN

Before a structure is considered, determine the stream flow. The culvert should be big enough to handle high water flows. This suggested method is quick; however, it does not estimate return flows.

The Hasty Method uses measurements taken in the stream channel to estimate the size of the opening, including a 100-percent safety allowance. To make the estimate do the following:

A. Measure the width (W_2) of the channel at the bottom. See Figure E-3.

B. Measure the width (W_1) of the channel at the high water mark.

C. Measure the height (H) from the channel bottom to the high water mark.

D. Add the widths and multiply by the height to obtain the cross section area, including a 100-percent safety factor.

Example:

Waterway end area

W_1 = 3 feet

W_2 = 1 foot

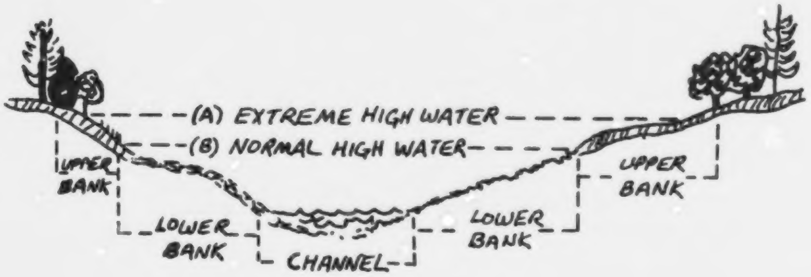
H = 2 feet

sq. ft. = $H \times (W_1 + W_2)$

= $2 \times (3 + 1)$

= 8 sq. ft. with 100% safety factor

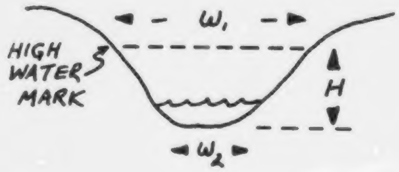
FIGURE E-3 Calculating Culvert End Area by the Hasty Method.


(A) EXTREME HIGH WATER
(B) NORMAL HIGH WATER
UPPER BANK
UPPER BANK
LOWER BANK
LOWER BANK
CHANNEL

(A) Flooding - the floodplain is completely covered
(B) High Water - the channel full to the normal high water line

Channel - always wet
Lower Bank - intermittently submerged - high water to summer flow level.
Upper Bank - from land slope break to high water

Stream Channel Terms


W_1
HIGH WATER MARK
H
W_2

W_1 - channel width at high water in feet
W_2 - channel width a bottom in feet
H^2- height of high water above channel bottom in feet

Culvert Area
With 100% = H x $(W_1 + W_2)$
Safety Factor
Square Feet

Culverts are normally produced in 6" diameter increments above 18". Reference to Table E-2 below shows that a 36" culvert has an area of 7.1 $ft.^2$ and a 42" culvert has an area of 9.6 $ft.^2$. A 42" culvert satisfies the conditions of this example. If the stream gradient is less than 5% and free of debris, the 36" diameter culvert could be used.

TABLE E-2 Sizes of Corrugated Metal Pipe for Areas of Waterway

Waterway Area Square Feet	Culvert Diameter Inches
1.80	18
3.10	24
4.90	30
7.10	36
9.60	42
12.60	48
15.90	54
19.60	60
23.80	66
28.30	72
33.20	78
38.50	84
44.20	90

(Haussman, 78)

There are several other methods to estimate flows and flow frequency. This method is suggested because of its simplicity.

FLOOD FREQUENCY AND RISK ASSESSMENT

Regardless of the structure selected, it should be large enough to carry selected peak flows with acceptable risk limits. Since costs increase rapidly with size, adequate site specific flood magnitude and frequency studies are essential.

Use of recommended recurrence intervals is a traditional approach to sizing structures. Size requirements should be based also on the anticipated risk of failure with the flow recurrence interval. The percent chance of failure selected for a given structure depends on the anticipated economic and environmental hazards. Table E-3 shows the design flood recurrence intervals needed to provide a given project life with a given chance of failure and provides an example of a use of the method.

Once management has defined the amount of risk they are willing to accept, selection of the design recurrence interval can be made from the chart. The key factor to consider in determining the amount of risk are the consequences if the culvert or bridge should fail during the design life.

TABLE E-3 Calculated Risk Table (Recurrence Interval in Years)

		Percent Chance of Failure or Success								
Success		90	80	70	60	50	40	30	20	10
Failure		10	20	(30)	40	50	60	70	80	90
Structure	1	10	5	4	3	2	2	2	2	2
Design	5	48	23	15	11	8	6	5	4	3
Life	10	96	46	29	21	15	12	9	7	5
	15	143	68	43	30	23	17	13	10	8
	(20)	190	91	(57)	40	30	23	18	13	10
	25	238	113	71	50	37	28	23	17	12
	30	285	135	85	60	44	34	26	20	14
	35	333	157	99	70	51	39	30	23	16
	40	380	180	113	79	59	45	34	26	18
	45	478	202	127	89	66	50	38	29	21
	50	475	225	141	99	73	56	43	32	23
	60	570	269	169	118	88	66	51	38	27
	70	665	314	197	138	101	77	59	44	31
	80	760	359	225	157	116	88	67	51	36
	90	855	404	253	177	130	99	76	57	40
	100	950	449	281	196	145	110	84	63	44

Example: If a culvert through a road is to last for 20 years with a 30-percent chance of failure, the culvert should be designed for the 57-year flood recurrence event.

Based on the formula (reference unknown) J = 1 - (1 - 1/T) N, where N = Design Life, T = Flood Recurrence Interval, J = Chance of Failure

EROSION CONTROL BY GRASS SEEDING

Harvest Areas

Where grass seeding is necessary to prevent erosion after logging or post sale activities, the following seed mixtures are recommended (Table E-4). These species and seeding rates provide ample protection. Adverse effects may occur on tree regeneration where grass is seeded on some sites.

TABLE E-4 Recommended Seed Mixtures for Erosion Prevention on [illegible]mber Sale Areas

	Seeding rate by vegetative zone			
Seed Mixture	Ponderosa pine assn	Douglas-fir larch 1/	Mixed 1/ Conifer	Spruce (wet)
DRY SITE (less than 2 inches available water per foot of soil)				
Crested wheatgrass - *Agropyron cristatum*	3	3		
Pubescent wheatgrass 2/ - *A. tricophorum*	2	2		
Hard fescue - *Festuca ovina var. duriscula*	1	1		
Whitmar beardless wheatgrass - *A. inerme* (use in place of crested wheatgrass if seed available)	(3)	(3)		
TOTAL	6	6		
MOIST SITE (between 2-4 inches available water per foot of soil)				
Orchardgrass - *Dactylis glomerata*		1	1	
Intermediate wheatgrass - *A. intermedium*		3	3	
Hard fescue - *F. ovina var. dursicula*		1	1	
TOTAL		5	5	

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WET SITE (more than 4 inches available water per foot of soil)

Annual rye - *Lolium multiflorum*	3	3
Perennial rye - *L. perenne*	3	3
Tall fescue - *F. arundinacea*	1	1
TOTAL	7	7

1/ Lodgepole pine will generally be found within these two zones; use the appropriate seed mixture.

2/ This is a sod former and should be used on road cuts and fills. Don't apply when tree regeneration is needed.

Seeding after each operation generally increases seeding rates so that tree reproduction and/or growth is retarded. Specific seeding prescriptions must be prepared to show objectives of seeding and to assure that only enough seed is put on the ground to meet these objectives. These seeding prescriptions must consider the overall management objectives for the area.

These recommendations are for soils with moderate erosion hazard. Seeding rates should be adjusted on soils with high or severe erosion hazard or where reproduction is adequately established and seeding is replacing forage for wildlife or domestic stock. Follow the guides in FSM 2482.3, R-6 Supplement No. 248, dated November 1977 for guidance when planning seed mixtures in excess of those needed for erosion control and prevention.

An Interdisciplinary Team of a Silviculturist, Range Conservationist and/or Wildlife Biologist should determine when adjustments for reasons other than erosion prevention are needed.

The following list is of species that can be seeded for the special purpose listed:

	Site Adaptability
1. Severe Erosion Sites - add to recommended mixtures - Highland bentgrass - *Agrostis sp.* 1 lb/acre	Moist

2. Wildlife Purposes
   - White clover - *Tr. folium repens* Moist
   - Sweet clover - *Melilotus officinalis* 15"+ ppt.
   - Various native shrubs
   - Tall wheatgrass - *Agronpyron elongatum* 12"+ ppt.
   - Smooth brome - *Bromus inermis* 15"+ ppt.
   - Burnet - *Sanguisorba minor* - Wide range

3. Domestic Stock
   - Smooth brome - *Bromus inermis* Moist

     Note: Strongly rhizomatous, do not use where competition with tree seedlings will be a factor

Fertilization

Generally, fertilization is not necessary after logging and post logging operations. If skid trails, temporary roads and landings are cut well into the subsoil or seeding is on dry, infertile sites, an application of fertilizer may be helpful for plant growth. On these sites, an ammonium phosphate- nitrate fertilizer with 4% sulphur should be used (27-12-0 sulphur 4.1%). Application should be at a rate that will provide 30 pounds of nitrogen per acre. For example, if 1.5 acres are to be covered with 30# of nitrogen, the total fertilizer required is $= \frac{1.5 \times 30}{.27} =$ 67.5 pounds of ammonium phosphate-nitrate fertilizer.

Roadway Slopes and Roadsides

Following are the grass seed mixture recommendations for use when seeding roadway cuts and fills on the Okanogan National Forest (Table E-5). These recommendations are made for vegetative zones and should be used within the zones specified unless seed for a specific species is unavailable. If seed for a particular species is unavailable, the Forest Soil Scientist or Range Specialist will recommend a suitable substitute.

TABLE E-5 Grass Seed Mixture Recommendations for Road Cut and Fill Slopes

Seed Mixture 1/	Seeding rate by vegetative zone Shrub grass	 Ponderosa pine assn	 Mixed Conifer	 Sub-alpine
DRY SITE				
Crested wheatgrass - *Agropyron cristatum*	3	3		
Pubescent wheatgrass *A. tricophorum*	8	8		
Hard fescue - *Festuca ovina var. duriscula*	4	4		
TOTAL	15	15		
MOIST SITE				
Intermediate wheatgrass - *A. intermedium*		4 2/	4	4
Pubescent wheatgrass - *A. tricophorum*			4	4
Orchard grass - *Dactylis glomerata*		3 2/	3	3
Chewing's fescue - *F. rubra var. commutata*			3	3
White clover - *Trifolium repens*			1 2/	
TOTAL			15	14

1/ Seed species listed are currently available under GSA contract.

2/ Substitute one of these species for crested wheatgrass on north slopes and more moist sites within the zone.

3/ Survival generally good only in moist sites.

Fertilization

Use of fertilizer on cut and fill slopes is necessary to assure good survival of seeded species. Nitrogen is usually the most important element needed on raw cut and fill slopes. Phosphorus is also needed to assure good root development and winter hardiness. In addition to these two common elements, sulphur should be included in the formulation used on the Okanogan. Only pelleted forms of fertilizer that are a chemically homogenized mix (not a mechanical mix) should be used. Table E-6 shows recommended fertilizers. If deviations from this table are necessary, select a formulation that will provide the prescribed element. Follow-up application of fertilizer may be desirable and necessary until plants are fully established.

TABLE E-6 Interim Fertilizer Guidelines for Erosion Control on Road Cuts and Fills*

		Sack Pounds of Various Materials Required to meet Nutrient Requirements Per Acre				
Material	Nutrient Requirement	Nitrogen (N) 50#	Phosphorus (P205) 42#	Potassium (K20) 0#	Sulfur (S) 25#	Sack Lbs. of Material
1.	Ammonium-phosphate-sulfate 16-20-0 (combined sulfur 16%)	24#	30#	0#	24#	150
**2.	Ammonium-phosphate-nitrate 27-12-0 (sulfur % 4.1)	27#	12#	0#	4.1#	100
Total sack pounds per acre						250

*Source - Boyer, D. E., and Legard, H.; Forest Land Fertilization; USDA, Forest Service, Region 6 Publication; 1973; 32 pp.

**If split application proves necessary, apply Number 1 in the autumn and follow with Number 2 the next spring. Soils less than 40 inches deep should have split applications of fertilizer.

Mulching

Mulching is generally not necessary on the Okanogan. It is an expensive practice which can easily double the cost of seed application. On highly erodable soils, such as south and west slopes 1/, and other situations where mulching is required, use the following procedures:

1/ As defined in SRI and confirmed by Soil Scientist.

1. Apply as a separate operation from seeding and fertilizing, always after the seed and fertilizer.

2. Increase the amount of nitrogen in the fertilizer mix to 75 pounds per acre.

3. Prescribe the type of mulch to best fit the situation.

Slope Preparation

Slopes should be rough with horizontal depressions that will catch seed and prevent it from washing to the toe of the slope.

TIMBER CONTRACT CLAUSES FOR WATERSHED PROTECTION

The timber sale contract provides for protection of soil and water resources through several standard (B) and special (C) clauses. Combined with well defined management objectives, good sale planning and administration, timber sale operations can be managed to provide an appropriate end result. A brief summary and discussion of timber sale contract clauses which can be utilized to protect soil and water resources follows:

B6.34 Sanitation and Servicing

This clause controls sanitation and equipment servicing to avoid pollution of lakes and streams.

B6.5 Streamcourse Protection

This clause controls operations within designated streamcourses as identified on the Sale Area Map.

B6.6 Erosion Prevention and Control

This clause stresses the need to minimize erosion and discusses the timeliness of erosion control work to be performed by the Purchaser. It also points out that the need to control run-off is a key consideration.

B6.61 Meadow Protection

Controls equipment use in meadows and provides for tree and slash removal in a manner necessary to protect cover, soil and water.

B6.62 - B6.66 Temporary Roads, Landings, Skid Trails and Firelines, Current Operating Areas, and Erosion Control Structure Maintenance

These clauses discuss the Purchaser's and the Government's responsibilities in erosion prevention and control in these specific areas.

C6.313 Special Cutting Schedule

This provision is authorized for use only with sales where one or more subdivisions of the Sale Area are in urgent need of early logging to prevent losses because of abnormal windthrow, fire damage, beetle infestation, etc. This clause could be of help where windthrow is causing degradation of water quality and removal of the windthrown trees is a top priority.

C6.315 Sale Operation Restriction

Forest Supervisor may approve use when necessary to eliminate or reduce conflicts with fish and wildlife management goals, or soil and water management goals, when supported by an appropriate analysis and recommendation prepared by a fish or wildlife biologist, soil scientist or hydrologist.

C6.32 Protection of Reserve Trees

This clause could be used to protect key trees in a buffer strip, particularly those anchoring a stream bank, or to protect wildlife trees in a streamside zone or elsewhere.

C6.41 Special Felling Objectives

This clause provides for directional felling of trees in buffer strips designated on the ground and on the Sale Area Map. Streamcourses to be protected must be designated on the Sale Area Map as described in B6.5.

C6.42 Special Yarding Objectives

This clause is not restricted to skyline, balloon or helicopter yarding, but can be applied in any situation involving special operations to protect stream courses, banks, vegetation, etc. The latitude provided is adequate to handle nearly all possible situations, but a logging specialist should be consulted if there is any question of feasibility or the possibility of an appraisal allowance. For example, it is possible to require a skidding plan prior to temporary road construction on tractor sales.

C6.422 Constructed Landings

Construction of landings which could cause significant water quality or soil productivity degradation can be controlled by the use of this clause and appropriate drawings.

C6.43 Conduct of Logging in Critical Multiple Use Areas

This clause, used in conjunction with C6.4 (Option 1) provides good control over tractor operations in areas such as streamside zones.

C6.46 (Option 1) Winter Logging

This provision will be used only when it is necessary to prevent soil disturbance, as would be the case in a developed recreational area, or to prevent unnecessary breakage in areas such as lava outcrops.

C6.46 (Option 2) Winter Logging

Use only for critical soil areas where replacement of destroyed cover plants cannot be guaranteed or the cost of replanting cannot be justified.

C6.5 Streamcourse Protection

This clause is for use in cases where it is determined that debris removal operations would bemore detrimental to water quality than leaving debris in place.

C6.51 Protection of Streamcourses

This clause provides for directional felling away from streamcourses designated by stream class on the Sale Area Map. Removal of material misfelled into a classified streamcourse is dependent upon direction from the Forest Service. This clause requires Regional Forester approval for use on Class III and IV streams.

C6.52 Streamcourse Protection

This clause provides for the preservation of naturally buried or imbedded Included Timber (keyed-in logs).

C6.6 Erosion Control and Soil Protection by Purchaser

When it is apparent that B6.6 will not satisfactorily accomplish necessary erosion control and soil protection, this clause can be used to require the purchaser to perform additional work or enter into a cooperative agreement with the Forest Service for performance.

C6.601 Erosion Revegetation Protection Fence

This provision provides for construction of fence to protect erosion seeding from grazing.

APPENDIX F

DEER COORDINATION REPORT

TIMBER/DEER COORDINATION - Report on Task I

This concerns problems which were identified on September 21 and 22, 1983. The group defined Task I as follows:

Six steps were deemed necessary in order to better establish the stand age (size) needed for snow intercept/thermal cover.

1. Develop uniform definition of all forms of cover (SI/T, hiding, thermal, etc.).
2. Define function of each form of cover.
3. Define stand characteristics needed to attain a certain cover quality.
4. Develop assumptions for use in LMP and project planning based on cover needs.
5. What amounts/ratios do we work with?
6. How do we measure cover? (for monitoring and inventory) Also define areas of application.

The task group of Dennis Lowry, Dick Haines and Rob Shull, with involvement and direction from John Hook, addressed these steps. Our report is summarized in the following pages.

SNOW INTERCEPT THERMAL (SIT) COVER

Purpose - to reduce the energy expense due to movement and temperature regulation by deer, and to provide forage during periods of deep snow ($\geq$18").

Characteristics

1. Multi-storied stand with at least two levels, one being small-to-large sawlog-sized, and one being sapling-to-pole-sized
2. Evergreen trees in overstory and understory
3. Snow interception capabilities provided by total crown closures of $\geq$60% (overstory of $\geq$12" trees and $\geq$40% crown closure; understory $\geq$20% crown closure)
4. Hiding cover is present primarily to provide a windbreak on $\geq$50% of area

5. Forage component is present (e.g., Douglas-fir, arboreal lichens, available shrubs and half-shrubs)

6. Block sizes to manage for:

   Minimum - 20 acres, or 40% of 50-acre block in any sized patches (see definitions for "patch" and "block")

   Optimum - >100 acres

   Maximum - N/A

7. Minimal human disturbance

8. Cover is adjacent to areas receiving solar insulation (e.g., ridgetops, knolls, and upper 1/3 of slopes)

9. Cover is predominantly on north aspects

10. Cover is usually best at lower elevations

Assumptions

1. Multi-storied stands intercept snow better than single-storied stands

2. Deciduous trees do not intercept snow

3. A 12" tree is the minimum size that can support large amounts of snow (has rigid branches)

4. As crown diameter and depth increases, snow interception increases

5. Hiding cover is needed for security and thermal (wind break) values

6. Conifer needles and lichens are major components of deer diets during winter

7. Lichen availability increases with age of stand

8. Concerning medium-sized blocks, many areas have a patchy distribution of SIT cover (see defintions for "patch" and "block")

9. Concerning optimum-sized blocks, deer are often dependent on SIT cover for extended periods

10. Areas with solar insulation are sought by deer during winter

11. Less energy is required to negotiate snow on north aspects (with powder snow) than on south aspects (with crusted snow)

12. The lower the elevation, the less snow accumulation

13. SIT cover is a limiting factor to deer populations on deer winter ranges, and "the" limiting factor in the Okanogan Highlands.

WINTER THERMAL (WT) COVER

Purpose - to reduce the energy expense of regulating body temperature (to conserve body heat)

Characteristics

1. Evergreen trees
2. Dense understory
3. ≥75% crown closure (≥40% in sapling component; ≥25% in pole component)
4. Block sizes to manage for:

   Minimum - 5 acres (see definitions for "patch" and "block")
   Optimum - 20 acres
   Maximum - 40 acres

Assumptions

1. Evergreen conifers and dense understory will restrict air movement and reduce loss of radiant heat.
2. Snow interception is not a necessary part of this cover type.
3. Block sizes are based on Blue Mountains data (Thomas et al, 1979)
4. This cover type is most applicable to Methow deer winter ranges where open, wind-swept slopes are used heavily.

HIDING COVER

Purpose - to provide security from predators and human harassment

Characteristics

1. Vegetation capable of hiding 90% of a standing adult deer at 200 feet or less
2. Cover height is ≥4-1/2 feet
3. Vegetative types are shrubs or trees
4. Vegetation is coniferous on winter ranges

5. Block sizes to manage for:

   Minimum - 5 acres (see defintions for "patch" and "block")
   Optimum - 20 acres
   Maximum - 40 acres

Assumptions

1. Characteristics are based on Blue Mountains data (Thomas et al, 1979)

2. Four and one-half-foot vegetative height is an adequate height for adult mule deer, which average 3-1/2 feet or less at shoulder height (Wallmo et al, 1981)

3. Deciduous vegetation does not provide hiding cover in winter.

SUMMER THERMAL COVER

Purpose - to provide cooling to help regulate body temperature.

Characteristics

1. Trees ≥40 feet tall (pole-sized or greater)

2. Crown closure ≥50%; if multi-storied, at least 30% in overstory.

3. Trees are evergreen or deciduous.

4. Block sizes to manage for:

   Minimum - 20 acres (see definitions for "patch" and "block")
   Optimum - 40 acres
   Maximum - 100 acres

Assumptions

1. Air movement occurs due to natural pruning of lower branches.

2. Solar interception is provided by crown closure

3. Not all shade needs to be provided by 40-foot trees, but need at least 30% crown closure in overstory.

4. Both coniferous and deciduous trees provide shade during summer.

5. Block sizes are based on Blue Mountains data (Thomas et al, 1979).

FAWNING COVER

Purpose - to provide security and shade near water.

Characteristics

1. Patchy distribution of trees, shrubs, logs or other cover 2-6 feet tall for security.
2. Patchy distribution of sapling or larger sized trees on 25-50% of area for shade.
3. Within 600 feet of available water.
4. Block sizes to manage for:

   Minimum - 1 acre (see definitions for "patch" and "block")
   Optimum - 5 acres
   Maximum - N/A

5. Disturbance from concentrations of humans and livestock is minimal during fawning (June is peak).

Assumptions

1. Patchiness is needed because does and fawns tend to bed on edge of cover for security and outward visibility.
2. Shade is needed to maintain adequate thermal environment for newborn, stationary fawns.
3. Water is needed for succulent vegetation and lactating does.
4. Block sizes are based on Blue Mountains data (Thomas et al, 1979).
5. Continual disturbance can cause doe to abandon fawn(s).

Amounts/Ratios*

DEER WINTER RANGE	North Half	Methow and Other
Snow Intercept Thermal Cover		
Min	15%	15%
Opt	30%	20%
Max	N/A	N/A
Winter Thermal Cover		
Min	5%	10%
Opt	10%	15%
Max	N/A	N/A
Hiding Cover (on winter range)		
Min	15%	0%
Opt	20%	5%
Max	N/A	N/A
Total Cover Amounts		
Min	35%	25%
Opt	60%	40%
Max	N/A	N/A

NON-WINTER RANGE	North Half	Methow and Other
Summer Thermal Cover		
Min	15%	15%
Opt	20%	20%
Max	N/A	N/A
Hiding Cover (on summer range)		
Min	15%	15%
Opt	20%	20%
Max	N/A	N/A
Total Cover Amounts		
Min	30%	30%
Opt	40%	40%
Max	N/A	N/A

*Maximum amounts are not applicable because, generally, large amounts of cover either do not occur or are not limiting to deer populations.

Definitions (also see illustrations)

1. A patch is a single cover type of a size less than minimum for that cover type.

2. A block is an area classified for management as a dominant cover type. It may be:

   a. composed of 100% of that cover type, or

   b. composed of patches of a single cover type that comprise at least 60% of the area (block) (or down to 40% based on relative importance, availability, and effectiveness on that range).

General Assumptions

1. A stand (i.e., a stand of timber typed for uniform characteristics) can be a block.

2. Block sizes listed in cover type characteristics are guidelines.

3. More than one cover type can be realized on the same piece of ground.

4. Snow intercept thermal cover (SIT) also provides winter thermal (WT) cover (not vice versa).

5. Hiding cover is provided in SIT cover and WT cover.

6. Where deer reside yearlong (as typically found in the Highlands), winter range cover radios are the priority for management over summer range cover ratios. Winter range values are recognized as the major limiting factor, and summer habitat requirements are adequately met in areas managed for winter range conditions.

7. It is not necessary to describe fawning habitat percentages. Fawning cover is defined only to identify protection needs for project designs, management activities or Forest Plan.

8. All cover types are important in different ways to maintain deer numbers.

Openings

Purpose - to provide forage and solar insulation to wildlife.

Characteristics

1. Vegetated areas other than cover areas.

2. Block sizes to manage for:

   Minimum - N/A
   Optimum - $\leq$100 acres or $\leq$1,200 feet wide*
   Maximum - N/A

*While 30-40 acres is recognized as optimal for deer, 80-100 acres better suits the needs of numerous other wildlife species.

Measuring and Applying Cover Ratios (also see illustrations)

1. Count acres of cover (measure) by block and obtain cover ratios by winter and/or non-winter range types for:

   a. Projects - count by project area and associated TRI compartments.

      -- ratios will be measured first on the project area to assess and determine viability of project, then by compartment to again assess and determine the same.

   b. Monitoring (Forest Plan) - count and assess by management area.

2. Apply (prescribe) cover amounts and ratios by block in winter and/or non-winter range types for projects and Forest planning on the same scales described above for measuring.

Assumptions

1. Projects need to be assessed and prescribed for by project area to assure that cover is adequately distributed over a larger area. Distribution is as important as the amount of cover.

2. Projects need to be assessed and prescribed for by TRI compartment to monitor achievement, and to assure distribution and amounts of cover over a predetermined, constant area (i.e., projects come and go, but TRI compartments remain "forever").

3. The overall objective is to insure adequate distribution at every scale.

4. Deer winter range and non-winter range will each be assessed separately within project and compartment.

FIGURE F-1 Illustrations of Blocks and Patches.

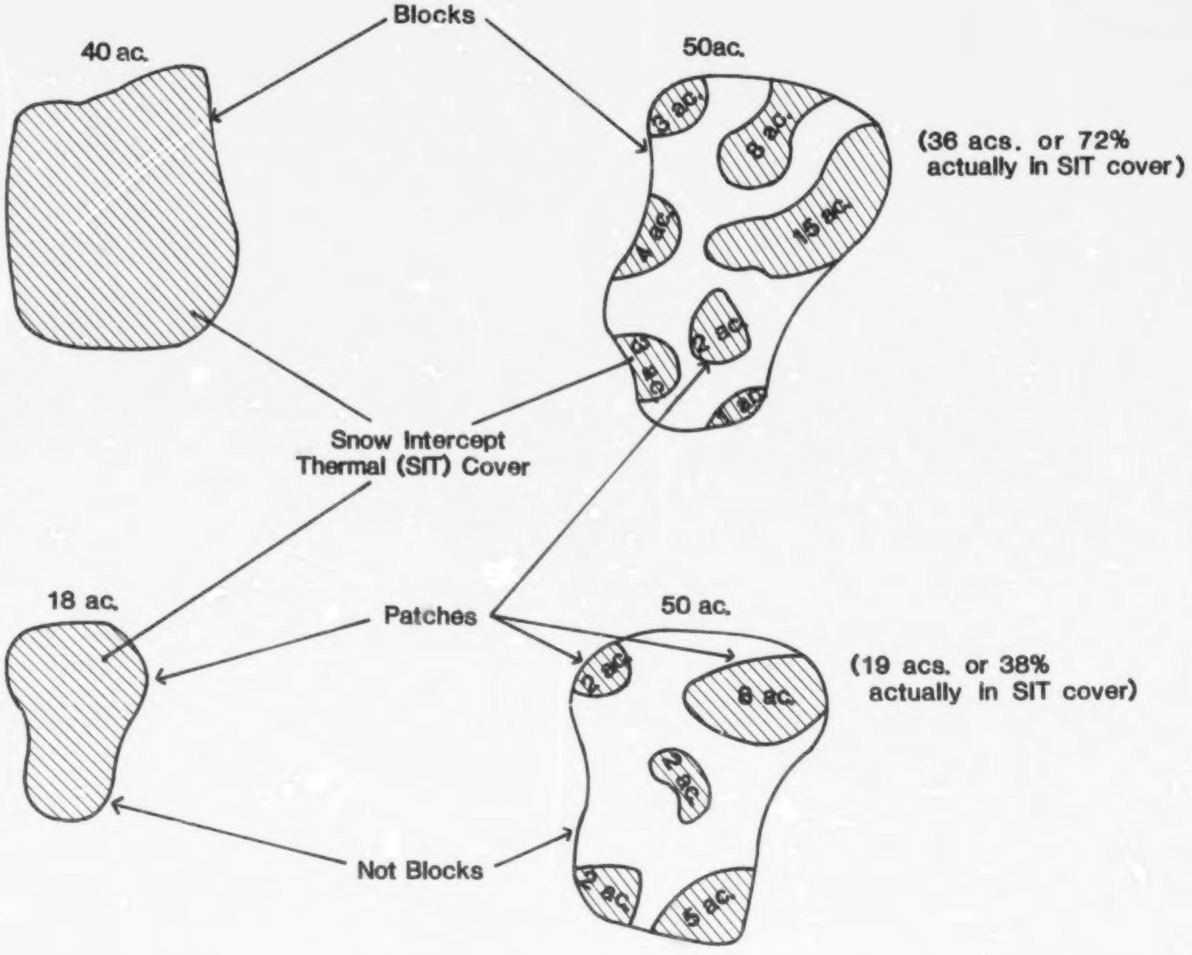
Blocks
40 ac.
50ac.
3 ac.
8 ac.
15 ac.
4 ac.
2 ac.
3 ac.
1 ac.
(36 acs. or 72% actually in SIT cover)
Snow Intercept Thermal (SIT) Cover
18 ac.
Patches
50 ac.
2 ac.
8 ac.
(19 acs. or 38% actually in SIT cover)
2 ac.
Not Blocks
2 ac.
5 ac.

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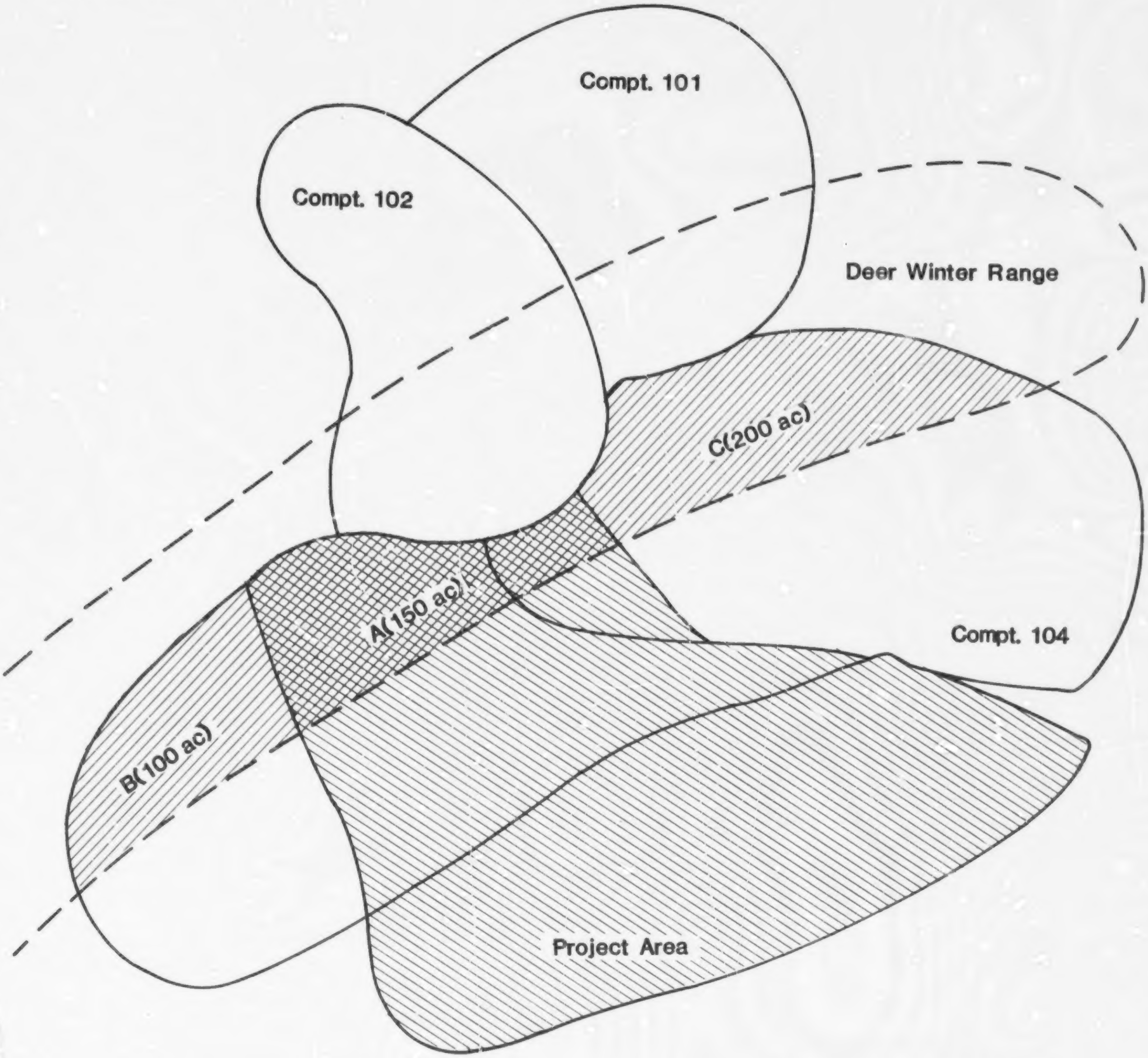
FIGURE F-2 Illustration for Measuring Cover on Deer Winter Range for a Project.


Compt. 101
Compt. 102
Deer Winter Range
C(200 ac)
A(150 ac)
Compt. 104
B(100 ac)
Project Area

First - Measure cover in A to see if project can stand on its own and provide cover

Second - Measure B and C to see if cover will be adequately distributed across larger, adjacent areas.

APPENDIX G

WILD AND SCENIC RIVERS

General Information

The assessment of a river for inclusion in the National Wild and Scenic River System follows a 3-step process:

1. Determination of eligibility - determined by applying criteria in sections 1(a) and 2(b) of the Wild and Scenic Rivers Act of 1968.
2. Potential classification - based on the conditions of the river and adjacent lands as they exist at the time of the study.
3. Determination of suitability - provides the basis for the decision to recommend designation or non-designation of the river.

Forest Service direction requires that the determination of eligibility and potential classification be addressed during the present planning process.

The determination of suitabilty can be delayed until revision of the Forest Plan or until a separate study is carried out, whichever occurs first. In this case, protection of the river area must be provided until a decision is made as to the future use of the river and adjacent lands.

Eligibility

Determination of eligibility is based upon criteria in Section 1(b) and 2(b) of the Wild and Scenic Rivers Act of 1968.

Section 1(b) of the Act states that to be eligible "the river, which, with their immediate environments, possess outstandingly remarkable scenic, recreation, geologic, fish and wildlife, historic, cultural or other similar values".

Section 2(b) of the Act states that to be eligible "the river is a freeflowing stream and the related adjacent land area possess one or more of the values referred to in Section 1(b).

In applying the criteria for eligibility, the following points are relevant:

> The fact that a river segment may flow between large impoundments will not necessarily preclude its designation. Such segments may qualify if conditions within the segment meet the criteria.

Only one outstandingly remarkable value is needed for eligibility.

In addition to the specific values listed in Section 1(b) of the Act, other similar values, such as ecological, if outstandingly remarkable, can justify inclusion of the river in the national system.

The determination of whether a river area contains "outstandingly remarkable" values is a professional judgement.

There are no specific requirements concerning the length or the flow of an eligible river segment. A river segment is of sufficient length if, when managed as a wild, scenic or recreational river area, the outstandingly remarkable values are protected. Flows are sufficient if they sustain or complement the outstandingly remarkable values for which the river would be designated.

Classification

Classification of eligible river segments is based on existing conditions at the time of the study. The classifications (USDI and USDA 1982) are:

Wild - "Those rivers or segments of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America". These criteria are interpreted as follows:

River area shall be free of impoundments.

River area shall not contain roads or other provisions for vehicular travel. The existence of a few inconspicuous roads leading to the boundary of the river area will not necessarily bar wild river classification.

River area shall show little or no evidence of human activity. Shorelines and watersheds should be essentially free of such things as buildings, pipelines, powerlines, dams, pumps, generators, diversion works, rip-rap and other modifications of the waterway or adjacent lands. The existence of a few inconspicuous structures, particularly those of historic or cultural value, need not bar wild classification. A limited amount of livestock grazing or hay production may be considered "essentially primitive". There should be no row crops or ongoing timber harvest and the river area should show little or no evidence of past logging activity.

The water quality of a wild river shall meet or exceed Federal criteria or federally approved State standards for aesthetics, for propagation of fish and wildlife normally adapted to the habitat of the stream, and for primary contact recreation except where exceeded by natural conditions.

Scenic - "Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines undeveloped, but accessible in places by roads". These criteria are interpreted as follows:

River area shall be free of impoundments.

River area shorelines and immediate environment should not show substantial evidence of human activity. The portion of the watershed within the boundary of the river area may have some discernible existing development. "Largely primitive" means that the shorelines and the immediate river environment still present an overall natural character, but that in places may be developed for agricultural purposes. Row crops would be considered as meeting the test of "largely primitive", as would timber harvest and other resource use, providing such activity is accomplished without a substantial adverse effect on the natural appearance of the river or its immediate environment.

Structures or concentration of structures must be limited to relatively short reaches of the total river area.

Roads may reach the river area and occasionally bridge the river. The presence of short stretches of conspicuous or longer stretches of inconspicuous and well-screened roads will not necessarily preclude scenic classification. In addition to the physical and scenic relationship of the free-flowing river area to roads, consideration should be given to the type of use for which such roads were constructed and the type of use that would occur within the river area.

Recreational - "Those rivers or sections of rivers that are readily accessible by road, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past". These criteria are interpreted as follows:

River area may contain existing parallel roads in close proximity to one or both banks of the river as well as bridge crossings and roads fording or ending at the river.

River area may have been developed for the full range of agricultural and forestry uses, may show evidence of past and ongoing timber harvest and may include some residential, commercial or similar development.

River area may have some existing impoundments, diversions and other modifications of the waterway having an impact on the river area. Existing low dams, diversion works, rip-rap and other minor structures will not bar recreational classification, provided the waterway remains generally natural in appearance.

Specific River Information

Eligibility

Methow River

This river exhibits remarkable scenic values. The headwaters are in a narrowly incised valley and the lower stretches run through a pastoral valley. The pastoral valley, combined with the nearby backdrop of Cascade Peaks, makes the river visually appealing. Scenery from the river is relatively natural because of streamside vegetation and cliffs (USDI 1982).

The non-National Forest portion of the river supports a wide variety of recreational activities. Rafting use has increased in recent years, particularly below Winthrop.

That portion of river from its mouth to Rattlesnake Creek is considered a major anadromous/resident fishing stream with an excellent pool/riffle ratio and clear water. It is also considered a major wintering area for big game and raptors, including bald eagles (USDI 1982).

The river remains free flowing through the major portion of the primary use season, although in low flow years portions of the river between Mazama and Winthrop have no surface water flowing (Bucknell 1983).

Chewuch River

This river exhibits remarkable scenic values from its headwaters to the Pasayten Wilderness boundary, and below the National Forest boundary where it runs through a pastoral agricultural setting.

That portion of river between the Pasayten Wilderness and the National Forest boundary supports a wide variety of recreation activities. Rafting use on this portion of river has increased in recent years.

That portion of river from its mouth to the Pasayten Wilderness boundary is considered anadromous fish habitat.

The river remains free flowing through the major portion of the primary use season.

Lost River

This river flows through a deep scenic gorge and exhibits remarkable geologic and scenic values.

That portion of river from its mouth to the Pasayten Wilderness boundary is considered anadromous fish habitat.

The river remains free flowing through the major portion of the primary use season.

Twisp River

This river (both the North Fork and South Fork) exhibits remarkable scenic values from its headwaters to the Lake Chelan/Sawtooth boundary.

That portion of river between the Lake Chelan/Sawtooth Wilderness and the National Forest boundary supports a wide variety of recreation uses.

That portion of river between its mouth and South Creek is considered anadromous fish habitat.

The river remains free flowing through the major portion of the primary use season.

Wolf Creek

This creek (including the North and South Forks) exhibits remarkable scenic values from its headwaters in the Lake Chelan/Sawtooth Wilderness to its confluence with the Methow River.

The creek remains free flowing through the major portion of the primary use season.

Pasayten River

The Middle Fork and West Fork of this river exhibit remarkable scenic values their entire lengths. The East Fork, which flows through dense timber stands, exhibits no remarkable values required for eligibility.

The Middle Fork and West Fork remain free flowing through the major portion of the primary use season.

West Fork San Poil River

This river exhibits no remarkable values required for eligibility.

Potential Classification of Eligible River Sections

Methow River

That section of river from its head to Hungry Creek (13.0 miles) is classified as wild because the river is free of impoundments, is accessible only by a non-motorized trail, the surrounding area is essentially in a primitive state and water quality is naturally high.

That section of river from Hungry Creek to the private land boundary near Lost River (2.5 miles) is classified as recreational because of the influence of the Hart's Pass and Rattlesnake Roads and past timber harvest activities.

That section of river from the private land boundary near Lost River to its mouth (64.5 miles) is classified as recreational because of the close proximity of Highway 20 and the amount of development, including agricultural, residential, and industrial, along its shoreline and immediate environment.

Chewuch River

That section of river from its head to the Pasayten Wilderness boundary (14.5 miles) is classified as wild because the river is free of impoundments, is accessible only by non-motorized trails, the surrounding area is in a primitive state and water quality is naturally high.

That section of river from the Pasayten Wilderness boundary to the National Forest boundary (15.5 miles) is classified as recreational because of the close proximity of the West Chewuch Road which parallels the river for the entire section length, the close proximity of the East Chewuch Road which parallels the river for over 1/2 the section length, the amount of road access to the river, and the large amount of past and ongoing timber harvest in the immediate environment.

That section of river from the National Forest boundary to its confluence with the Methow River (11.0 miles) is classified as recreational because of the close proximity of both the West and East Chewuch Roads which parallel the river for the entire section length, and the amount of farming and residential development along the shorelines and immediate environment.

Twisp River

That section of river from its head to the Lake Chelan/Sawtooth Wilderness boundary (7.0 miles) is classified as wild because it is free of impoundments, is accessible only by non-motorized trail or cross country, the surrounding area is in a primitive state and water quality is naturally high.

That section of river from the Lake Chelan/Sawtooth Wilderness boundary to the private land boundary near Lime Creek (12.0 miles) is classified as recreational because of the close proximity of the North Twisp River Road which parallels the river for the entire section length, the close proximity of the South Twisp River Road which parallels the river to South Creek and the amount of past and ongoing timber harvest in the immediate environment.

That section of river from the private land boundary near Lime Creek to its confluence with the Methow River (13.0 miles) is classified as recreational because of the close proximity of the North Twisp River Road which parallels the river for the entire section length, the amount of road access to the river, and the amount of farming and residential development along its' shoreline and within the immediate environment.

Lost River

That section of river from its head to the Pasayten Wilderness boundary (17.0 miles) is classified as wild because it is free of impoundments, access is by non-motoried trail, the surrounding area is in a primitive state and water quality is naturally high.

That section of river from the Pasayten Wilderness boundary to just north of Lost River bridge (2.5 miles) is classified as wild because it is free of impoundments, access is by non-motorized trail, the area is generally in a primitive state and water quality is naturally high.

That section of river from just north of Lost River bridge to its confluence with the Methow River (.5 miles) is classified as scenic because of the influence of the Hart's Pass Road crossing the river, and past and ongoing timber harvest does not substantially effect the natural appearance of the river or immediate environment.

Pasayten River

The entire river from its head to the Canadian Border (32.0 miles) is classified as wild because it is free of impoundments, access is only by non-motorized trails, the surrounding area is in a primitive state and water quality is naturally high.

Wolf Creek

That section of creek from its head to the Lake Chelan/Sawtooth Wilderness boundary (17.0 miles) is classified as wild because it is free of impoundments, access is only by non-motorized trails or cross country, the surrounding area is in a primitive state and water quality is naturally high.

That section of creek from the Lake Chelan/Sawtooth Wilderness boundary to the Okanogan National Forest boundary (2.5 miles) is classified as recreational because of a diversion dam and aqueduct, the close proximity of roads in the immediate area, and evidence of past timber harvest activities.

That section of creek from the Okanogan National Forest boundary to its confluence with the Methow River (2.0 miles) is classified as recreational because a road parallels this section of creek for most of its' length and because of the amount of residential development along shorelines and in the immediate environment.

APPENDIX H

RECREATION OPPORTUNITY SPECTRUM (ROS)

Following is a brief description of the Recreation Opportunity Spectrum (USDA undated).

Briefly explained, the Recreation Opportunity Spectrum (ROS) considers:

> Where recreation activities occur (i.e., what type of setting is present based on the physical criteria of distance from the sights and sounds of humans, size of area and on-site evidence of human use; the social criteria of amount of visitor use; and the management criteria of type and noticeability of visitor controls?)
>
> What type of recreation activities occur (i.e., is the resource capable of sustaining the impact of the use, and is the activity suitable to the setting?)
>
> What experience people expect to receive from participating in a particular activity in a particular setting (i.e., challenge, solitude, nature awareness, etc.)

Based on where recreation activities occur, what type of recreation activities occur and what experience people expect, the following recreation opportunity classes have been identified:

> Primitive opportunities are provided in an unmodified natural environment. Visitors have a very high probability of experiencing solitude, freedom, closeness to nature, tranquility, self-reliance, challenge and risk. Little interaction occurs between visitors and little evidence of other visitors is present. Restrictions and controls are not evident. Access and travel is non-motorized on trails or cross-country.
>
> Semi-Primitive Non-Motorized opportunities are provided in a natural-appearing environment. Visitors have a high probability of experiencing solitude, freedom, closeness to nature, tranquility, self-reliance, challenge and risk. Little interaction occurs between visitors, but some evidence of other visitors is present. Restrictions and controls are minimal and subtle. Access and travel is non-motorized on trails or cross-country.
>
> Semi-Primitive Motorized opportunities are provided in a predominantly natural environment. Visitors have a moderate probability of experiencing solitude, tranquility and closeness to nature and a high probability of experiencing self-reliance, challenge and risk in the use of motorized equipment. Concentrations of visitors are low, but often evidence of other visitors is present on trails. Restrictions and controls are minimal and subtle. Access and travel is both motorized and non-motorized.

Roaded Natural opportunities are provided in a mostly natural appearing environment as viewed from sensitive roads and trails. Maintaining high visual quality is a key factor in providing this recreation opportunity. Timber management activities are designed to maintain or enhance recreation and visual opportunities. Visitors have the opportunity to associate with others in developed sites, but with some chance of privacy. Self-reliance on outdoor skills is only of moderate importance. Little challenge or risk are present. Interaction between visitors at campsites is of moderate importance. Some on-site controls and restrictions are obvious. Access and travel is by sedan and trailer, recreation vehicle and some motor homes.

Roaded Modified opportunities are provided in a substantially modified environment except for campsites. Roads, landings, slash and debris may be strongly dominant within the area, but remain subordinate from distant sensitive roads. Visitors have the opportunity to get away from others but with easy access. Some self-reliance is necessary in building campsites and in the use of motorized equipment. There is a feeling of independence and freedom. Little challenge or risk are present. Evidence of other visitors on roads is moderate, but little evidence or interaction with other visitors occurs at campsites. Few on-site controls and restrictions are present except for some gated roads. Access and travel is by sedan and trailer, recreation vehicle, off-road vehicle and motorbike.

Rural opportunities are provided in a natural environment that has management modifications yet remains attractive (i.e., pastoral farmlands). Background management activities may range from not obvious to dominant alterations. The opportunity to observe and associate with others, and the convenience of facilities are important. Self- reliance on outdoor skills is of little importance. Little challenge or risk is present except for such activities as downhill skiing. Interaction between visitors may be high. On-site controls and restriction are obvious and prevalent. Access and travel facilities designed for intensive motorized use.

Urban opportunities are provided in an urbanized environment with dominant structures. The opportunity to observe and meet others, and the convenience of facilities is very important. Outdoor skills, risk and challenge are unimportant except in competitive sports. Interaction between visitors is high. Numerous on-site controls and restrictions occur. Access and travel facilities are highly intense, motorized and often with mass transit.

APPENDIX I

VISUAL RESOURCE MANAGEMENT

Following is a brief description of terms used here to describe the visual resource (USDA 1974):

Variety Classes (Physical features of land)

Distinctive refers to those areas where landform, vegetative patterns, water and rock formations are of unusual or outstanding scenic quality. They are usually not common throughout the area.

Common refers to those areas where variety in form, line, color and texture or combinations of these attributes are common throughout the area but are not outstanding in scenic quality.

Minimal refers to those areas where there is little change in form, line, color or texture.

Sensitivity Levels (Peoples concern for scenic quality)

Level 1 refers to areas seen from primary travel routes and use areas where at least 1/4 of the visitors have a major concern for scenic quality; or areas seen from secondary travel routes and use areas where at least 3/4 of the visitors have a major concern for scenic quality.

Level 2 refers to areas seen from primary travel routes and use areas where fewer than 1/4 of the visitors have a major concern for scenic quality; or areas seen from secondary travel routes and use areas where between 1/4 and 3/4 of the visitors have a major concern for scenic quality.

Level 3 refers to areas seen from secondary travel routes and use areas where less than 1/4 of the visitors have a major concern for scenic quality.

Visual Quality Levels (Degree of acceptable alteration to the natural landscape)

Preservation allows ecological changes only. Management activities, except for very low impact recreation facilities, are prohibited.

Retention allows for management activities which repeat form, line, color and texture of the surrounding naturally-established landscape. Changes in the size, amount, intensity, direction and pattern of these attributes should not be evident.

Partial retention allows for management activities which repeat form, line, color and texture of the surrounding naturally-established landscape. Changes in the size, amount, intensity, direction and pattern of these attributes remain visually subordinate to the surrounding landscape.

Modification allows for management activities which dominate the surrounding, original naturally-established landscape but which borrow from the form, line, color or texture at such a scale that the activities' visual appearance is that of a natural occurrence.

Maximum modification allows for management activities which dominate the naturally-established landscape and which are out of scale or contain detail which do not appear as natural occurrences.

Rehabilitation is a short-term activity used to restore landscapes containing undesirable visual impacts to the desired visual quality level.

Enhancement is a short-term activity used to increase visual variety where little variety now exists.

AVAILABLE

APPENDIX J

SELECTION OF HARVEST CUTTING METHOD

Introduction

This appendix documents the rationale used to determine appropriate harvest systems to be used in managing coniferous forest stands on the National Forest during the next 10 years (or the life of the Plan) where timber production is a management goal. The rationale is based upon direction contained in the Code of Federal Regulations, in the Regional Guide, and in the Forest Service Manual. These sources of direction are in turn derived from Legislation, Executive Orders, and administrative direction from the Secretary of Agriculture and from the Chief of the Forest Service. Silvicultural systems (even-aged or uneven-aged) appropriate for use are identified for each management area where scheduled timber harvest may occur. Criteria are provided to identify situations when clearcutting may be prescribed as the optimal harvest cutting method.

The intent here is to document the rationale for selection of the broad harvest cutting methods (even-aged or uneven-aged) to be applied on the forest. The specific harvest treatment methods (such as clearcutting, seed tree cutting or group selecton) will be selected on a site specific basis, in accordance with direction contained in the Forest Plan, and as identified in environmental assessments or in silvicultural prescriptions written or approved by certified silviculturists.

Harvest Cutting Methods

Harvest cutting methods include both even-aged and uneven-aged silvicultural systems (Smith, 1962).

Even-aged management employs the following silvicultural systems:

> Clearcutting is the harvesting, in one operation, of all merchantable trees and the cutting or removal of all unmerchantable trees in an area to help establish an even-aged stand. The new stand may be created by natural regeneration, or by artificial methods such as planting of nursery grown seedlings or direct seeding of conifer seed.
>
> Shelterwood cutting normally involves two or more harvest cuttings including the seed cut and the overstory removal cut. One or more preparatory cuts may preceed the seed cut to develop windfirmness and to enhance the potential for seed production. At the seed cut, sufficient larger, mature trees per acre (typically 15 to 30) are retained to provide both protected micro-environments for germinating seedlings, and seed to establish the new stand. These mature trees are harvested once they are no longer needed for either shelter or for seed. In some situations where vegetation competition or poor vigor of leave trees preclude successful natural regeneration, artificial methods of reforestation may be used to reforest the site.

Seed tree cutting requires leaving a few good seed producing trees per acre (typically 5 to 15 trees) following the seed cut to provide seed. Seed trees are harvested once seedlings are established. Reforestation following seed tree cutting is almost always by natural regeneration.

Uneven-aged management employs the following silvicultural systems:

In the single-tree selection system, each tree is evaluated for its contribution to the desired characteristics and growth of the uneven-aged stand. Regeneration occurs in the microsites formerly occupied by mature trees after they are harvested. Continuous forest cover is maintained in each stand. Within each uneven-aged stand, trees of various heights and ages are present.

The group selection system requires harvesting trees in small groups (usually less than two acres). Group selection can employ either small clearcuts or small shelterwoods depending upon the individual stand and site characteristics. The group selection method uses the principles of even-aged management to create stands of many age classes. Each class is represented by several small even-aged groups.

Criteria for Determining Optimality of Clearcutting During Site Specific Analysis

Clearcutting may be prescribed only where it is found to be the optimum method of regeneration to meet multiple-use objectives (FSM 2471.1). Site specific analysis must be performed in accordance with direction contained in the Forest Plan prior to selecting clearcutting as the optimal harvest method. The analysis must be documented in the environmental assessment or the silvicultural prescription. Factors to be considered in the analysis include, but are not limited to, protection of soil productivity; watershed values, including water quality, quantity and regimine; wildlife habitat values; operational considerations such as logging system requirements; social concerns; harvest and post harvest costs versus current and projected dollar returns; aesthetics; recreation values; cultural resources; and potential for insect, disease or animal damage.

Clearcutting is the "optimal" regeneration method when it will result in the greatest net public benefits where relevant monetary and non-monetary factors are considered. When clearcutting is prescribed, harvest units would be shaped and blended to the natural terrain to the extent practicable.

Clearcutting is an accepted harvest method in the forest cover types found on the National Forest. Clearcutting is the recommended method in mature stands of Douglas-fir and associated species where heavy dwarf mistletoe infections are present in overstory and understory trees, and where root rots are present. Clearcutting is recommended in mature spruce-fir stands where the risks of windfall or spruce beetle attack are high, and in mature stands of lodgepole pine heavily infested by dwarf mistletoe or where the risks of windthrow or mountain pine beetle are high (Burns 1983).

Clearcutting may be considered as a possible regeneration method when the silvics of managed conifer species and the micro-environment created by clearcutting and subsequent fuel treatments are compatible, and there is reasonable assurance that reforestation may be accomplished within prescribed time frames. In addition, to be considered the optimum method, one or more of the following criteria must be met, and there must be no overriding factors (for example, soil stability, aesthetics or social concerns) that would preclude selection of clearcutting as the preferred harvest method.

1. Multiple-use considerations such as visual or recreation management, wildlife management, watershed management or range management indicate that substantial benefits may be obtained by clearcutting as opposed to harvest by other methods.

2. Existing fuel loading or fuel loading created by harvesting is sufficient that it is not economically or operationally feasible to protect residual trees, or to avoid unacceptable soil or watershed damage during treatment of activity fuels following completion of harvesting and subsequent cultural activities.

3. Root rots or dwarf mistletoes are present in the stand and are sufficiently serious that significant mortality and volume growth losses are likely to occur if susceptible species are perpetuated in the regenerated stand.

4. Topographic location, soil depth, species composition or other factors indicate that significant windthrow is likely to occur in residual trees following harvesting by other methods.

5. Economic and operational considerations such as logging or species valuation indicate insufficient volume or value will be present in the residual stand to permit subsequent silviculturally necessary treatments to occur.

6. Where, because of the effects of insects, disease or generally poor phsycological condition (vigor), it is unlikely that residual trees following shelterwood, seed tree or selection cutting would produce adequate amounts of seed to reforest the stand, and multiple-use, soils, watershed or other considerations do not preclude clearcutting.

7. Following a natural catastrophic event such as wildfire, insect attack, disease or windthrow.

A Discussion of Even-aged versus Uneven-aged Selection Criteria

The criteria used for selection of regeneration harvest cutting methods were developed using selection criteria identified in the Regional Guide for the Pacific Northwest Region (1984) as well as from direction provided in 36 CFR 219.27(b) for management prescriptions that involve manipulation of tree cover. A summary of criteria contained in these documents is shown below following the Combined Criteria used in selection of the harvest cutting method.

Combined Criteria Used For Selection of Harvest Cutting Method

The criteria identified in the Regional Guide and in 36 CFR 219.27(b) were combined to eliminate duplication of intent and to simplify the rationale for selecting the harvest cutting methods used to implement the Forest Plan. These seven combined criteria are summarized as follows:

1. Selected method must produce a volume of marketable trees that meet utilization standards and are designated for harvest. (Regional Guide: Criteria 1, 36 CFR: Criteria 7)

2. Selected method must use available and acceptable logging methods. (Regional Guide: Criteria 2, 36 CFR: Criteria 4 and 7)

3. Selected method must be capable of meeting special management and multiple-use objectives. (Regional Guide: Criteria 3 and 6, 36 CFR: Criteria 1 and 6)

4. Selected method must permit control of vegetation to establish desired species composition, density and rates of growth. (Regional Guide: Criteria 4, 36 CFR: Criteria 2, 4 and 6)

5. Selected method must promote a stand structure and species composition which minimizes risks from insects, disease, animal damage and wildfire. (Regional Guide: Criteria 5)

6. Selected method must assure that lands can be adequately restocked. (36 CFR: Criteria 2)

7. Selected method must be practical and economical in terms of transportation, harvesting, preparation and administration of timber sales. (36 CFR: Criteria 7)

In addition, no harvest cutting method was selected primarily because it resulted in the greatest dollar return or provided the highest output of timber, which permanently reduced site productivity, or that could not assure conservation of the water and soil resources. (36 CFR: Criteria 3 and 5)

Selection Criteria from the Regional Guide

The six criteria contained in the Regional Guide may be summarized as follows. They are displayed to aid in understanding the derivation of Combined Criteria shown above. For a more complete explanation of the criteria, please refer to the Regional Guide.

1. The selected method must permit the production of a volume of marketable trees sufficient to utilize all trees that meet utilization standards and are designated for harvest.

2. The selected method must permit use of a logging method which can remove designated trees without excessive damage to the residual stand and while meeting other established land management objectives. Table 3-1 in the Regional Guide displays the compatibility of logging systems with common harvest cutting methods. Generally, ground based logging methods, helicopters and cable methods using slack pulling carriages are appropriate for all harvest methods while cable methods without slack pulling carriages and balloons are appropriate only for clearcuts.

3. The selected harvest method must be capable of providing special conditions that are required to meet resource management objectives. Table 3-2 in the Regional Guide displays commonly used harvest methods which achieve desired forest character. Generally, both even-aged and uneven-aged methods can meet desired forest character with the exception of a mosaic of forest and opening and maximum wildlife species diversity. Here, the single-tree selection method of uneven-aged management is not applicable.

4. The selected method must permit control of vegetation to establish desired numbers and rates of growth of trees as well as other vegetation needed to achieve special management objectives. Tables 3-3 and 3-4 in the Regional Guide display common conditions under which these harvest cutting methods may be used. Generally, both even-aged and uneven-aged methods can be applied in vegetation zones occurring on the forest, however, uneven-aged methods are not applicable for wildlife forage production or for optimum tree seedling and sapling growth.

5. The selected method must promote a stand structure and species composition which minimizes serious risk from insects, disease, animal damage and wildfire and will allow treatment of existing insect, disease and fuel conditions. Table 3-5 in the Regional Guide displays harvest cutting methods favorable to the reduction and treatment of these agents. Generally, uneven-aged

methods are not applicable where dwarf mistletoe and root disease are present, or where defoliating insects such as western spruce budworm are common (Carlson 1982). Uneven-aged methods are also not generally applicable in stands where heavy fuel loadings exist.

6. The selected method must meet multiple-use management objectives identified in the Regional Guide and Forest Plan.

Selection Criteria from 36 CFR 219.27(b)

The seven criteria identified in 36 CFR 219.27(b) which direct management prescriptions for the manipulation of tree cover can be summarized as follows. They are displayed to clarify derivation of Combined Criteria shown above. For a more complete and precise text of the criteria, please refer to the Code of Federal Regulations.

1. Be best suited to multiple-use goals, considering biological, environmental, engineering, economics and other impacts.

2. Assure that lands can be adequately restocked following timber harvest except where permanent openings are created to provide wildlife habitat or for other purposes.

3. Not be chosen primarily because of the greatest dollar return or timber output, although these factors should be considered.

4. Consider the potential impacts on residual trees and adjacent stands.

5. Avoid permanent reduction of site productivity and ensure conservation of water and soil.

6. Provide the desired effects on water quality and quantity, wildlife and fish habitat, regeneration of desired tree species, forage production, recreation uses, aesthetic values, and other resources.

7. Be practical in terms of transportation and harvesting requirements and total costs of timber sale preparation, logging and administration.

Working Groups and Management Areas

Both even-aged and uneven-aged harvest cutting methods were available and evaluated for selection within the forest's species working groups and management area combinations. The four timber working groups and their applicable management area combinations are summarized below:

Working Group 1/	Managed Areas with 3/ Scheduled Timber Harvest		Species Found
Moist Productive	1, 2, 5, 9, 11, 12, 13, 14, 19	Major:	Douglas-fir, Engelmann Spruce
		Minor:	Western larch, ponderosa pine, subalpine fir, western red cedar, western white pine, lodgepole pine, white bark pine
Dry Productive	1, 2, 5, 9, 11, 14, 19	Major:	Douglas-fir, ponderosa pine
		Minor:	Western larch, lodgepole pine
Lodgepole Pine	1, 5, 9, 12, 13, 14, 19	Major:	Lodgepole pine
		Minor:	White bark pine, Douglas-fir, Engelmann spruce, subalpine fir
Low Productive 2/	1, 5, 9, 11, 12, 13, 14, 19	Douglas-fir, western larch, subalpine fir, lodgepole pine, ponderosa pine, white bark pine, Engelmann spruce	

1/ The mixed conifer type includes both Moist Productive and Dry Productive Working Groups.

2/ Both mixed conifer and lodgepole dominated stands occur in the Low Productive Working Group.

3/ See Chapter 2 and Appendix B of the EIS for description of management areas and prescriptions.

Rationale for Selection of Harvest Cutting Method

The following analysis documents the rationale for selection of harvest cutting method to be applied within each working group and management area during the next 10 years (or the life of the Plan) based on those combined criteria that have a significant effect on the selection. As was stated previously, tne specific harvest method (clearcut, shelterwood, seed tree, group selection or single tree selection) will be identified on a site specific basis, in accordance with with direction contained in the Plan and as documented in the environmental assessment or silvicultural prescription.

Moist Productive and Dry Productive Working Groups

Management Areas 1, 2, 14:

Lands within this management area will be managed for both timber, wildlife habitat and forage, and livestock forage production. Satisfactory tree growth rates should be maintained. Stands should be protected from insects, disease and damage. Both even-aged and uneven-aged methods are biologically possible. Even-aged methods generally provide enhanced forage production and maximize wildlife species diversity (Combined Criteria 3). Even-aged methods generally provide for enhanced seedling and sapling growth rates because of the significant depressing effect of mature or larger trees on height and diameter growth of understory trees (Barrett 1979) (Combined Criteria 4). For this reason, uneven-aged methods generally produce reduced timber volumes. Clearcutting allows the introduction of genetically improved stock. Dwarf mistletoe and root disease are common in many forest stands. Where they occur, uneven-aged methods are not applicable (Combined Criteria 5). Even-aged methods are more economical and practical in terms of transportation, harvesting, preparation and administration (Barrett 1979; Burns 1983) (Combined Criteria 7). Within the dry productive working group, periodic use of prescribed fire may in some instances reduce fuel accumulations and eliminate undesirable competitive vegetation (Combined Criteria 4). Even-aged methods are more compatible with this treatment. Although uneven-aged methods are biologically acceptable in most healthy stands, they generally produce reduced forage for livestock and big game, reduced timber yields, increased risk of disease and wildfire, and a considerable increase in management costs and complexity. For these reasons, even-aged harvest cutting methods are selected for these management areas.

Management Area 5:

Forest stands managed in this area will maintain visual diversity through variations of stand densities and size classes. Large, old growth trees will provide an important stand component. Both even-aged and uneven-aged methods are biologically possible in disease-free stands, and can provide for the visual variety and maintenance of a large tree component. Defoliating insects, dwarf mistletoe and root diseases are common in many forest stands. Where they occur, uneven-aged methods are not appropriate (Combined Criteria 5). The special conditions required to meet visual quality management objectives may take precedence over timber volume production (Combined Criteria 3). Tree growth rates should be sufficient to produce the characteristic large tree component within the rotation age and maintain trees in a healthy condition (Combined Criteria 4). Trees should be managed to minimize risks from insects, disease, animals and wildfire (Combined Criteria 5). Multiple canopy stands may be more susceptible to damage by defoliating insects (Carlson et al, 1982). For these reasons, even-aged management will generally be practiced in Management Area 5. Uneven-aged management, primarily group selection, may be practiced where site specific analysis determines it will best meet management direction.

Management Areas 9, 11:

Vegetation here will be managed to provide optimum habitat for wildlife. Special conditions required to meet the resource management objectives include providing hiding and/or thermal cover over 40 to 60 percent of the area as well as a vigorous forage base. Prescribed burning may be practiced for site preparation and forage enhancement. Although both even-aged and uneven-aged harvest cutting methods are biologically acceptable in healthy stands, even-aged methods can best provide for the special conditions within this management area (Combined Criteria 3). Uneven-aged methods are generally not applicable where the desired character is a mosaic of forest and openings. In addition, the transportation system and entry frequency necessary for management of uneven-aged stands present an undesirable opportunity for wildlife harassment. Dwarf mistletoe, defoliating insects and root rots are common in many forest stands. Where they occur, uneven-aged management is not appropriate (Combined Criteria 5). For these reasons, even-aged management will generally be practiced in these management areas.

Management Area 12:

Forest vegetation within this area should be managed to provide both a high level of timber outputs and quality habitat for lynx. Satisfactory tree growth rates should be maintained. Trees should be protected from insects, disease and damage. A mosaic of forest and openings is desirable for lynx. Even-aged methods provide for enhanced seedling and sapling growth rates (Combined Criteria 4) and provide the best opportunity for producing volumes of marketable wood that can be economically harvested (Combined Criteria 1, 7). The transportation system and harvest entry frequency necessary for uneven-aged management of stands present an undesirable opportunity for lynx harassment and for poaching. Both even-aged and uneven-aged harvest methods are biologically possible in healthy, disease-free stands. Defoliating insects, dwarf mistletoes and root diseases are common in many mixed conifer stands. Uneven-aged management is not appropriate where defoliators, dwarf mistletoe or root rots occur (Combined Criteria 5). High elevation stands are often in seasonally moist soils, and are highly susceptible to windthrow. For these reasons, uneven-aged management will not generally be practiced in this management area.

Management Area 13:

Vegetation will be managed to provide optimum habitat for wildlife, and to maintain the present high quality of water flowing from the forest. Special conditions required to meet management objectives include providing hiding and/or thermal cover on over 40% of the area, retention of down wood debris for small animal habitat and for nutrient cycling, and a high degree of forest canopy cover maintained along streams. Large trees are desired to provide quality snags to maintain optimal

(100% of potential population) habitat for cavity nestors. They are also desired for snow intercept thermal cover. Both even-aged and uneven-aged methods are biologically possible in healthy, disease-free stands. Dwarf mistletoe, defoliating insects and root rots are common. Where they occur, uneven-aged management is not appropriate (Combined Criteria 5). Tree growth rates should be sufficient to provide the large tree component desired (Combined Criteria 4). Transportation systems and entry frequency necessary for uneven-aged management present undesirable opportunities for wildlife harassment and for erosion with attendant deterioration of water quality (Combined Criteria 3). For these reasons, even-aged management will generally be practiced in Management Area 13. Uneven-aged management, primarily group selection, may be practiced where site specific analysis determines it best meets management direction.

Management Area 19:

Forest Vegetation in this management area will be managed to provide future optimum habitat for old growth dependent species such as spotted owl, barred owl, marten, 3-toed woodpecker and pileated woodpecker. During early portions of the rotation, diameter increments must be sufficient to develop large (20"+) trees. Large, relatively homogeneous stands (30 to 100+ acres) are necessary to provide desired habitat. Both uneven-aged and even-aged methods are biologically possible in healthy, disease-free stands. Uneven-aged methods will not develop large homogeneous stands desired (Combined Criteria 3). Dwarf mistletoe, defoliating insects and root rots are common in forest stands. Where insect and diseases are common, uneven-aged methods are not appropriate (Combined Criteria 5). High juvenile growth rates necessary to grow large trees are best produced by even-aged management (Combined Criteria 4). In addition, transportation systems and harvest entry frequency necessary for uneven-aged management present an undesirable opportunity for harassment of wildlife (Combined Criteria 3). For these reasons, Management Area 19 will be managed using even-aged methods.

Lodgepole Pine Working Group

Management Areas 1, 12, 14

Lands within these management areas should be managed for timber production, wildlife habitat and livestock forage production. Satisfactory growth rates should be maintained. Stands should be protected from insects, disease and wildfire. While some variation does occur, the lodgepole pine type is generally considered to be a pure, even-aged, single-storied, overly dense forest. This stand structure and condition provides the potential for a catastrophic mountain pine beetle epidemic. Lodgepole pine on the Okanogan National Forest exhibits a high degree of cone serotiny. Even-aged methods best take advantage of this trait to assure regeneration (Burns 1983). Although both even-aged and uneven-aged harvest cutting methods are biologically possible, the current stand structure, potential catastrophic conditions, timber sale economics and operational considerations strongly favor even-aged methods (Combined Criteria 2, 3, 4, 5). Because of low stumpage values, strong consideration must be given to methods which are practical and economical in terms of transportation, harvesting, and timber sale preparation and administration (Combined Criteria 7). Even-aged management will best create a mosaic of forest and openings to maximize forest diversity for wildlife species (Combined Criteria 3). Even-aged management will provide greatest opportunity for production of economically attractive volumes of merchantable trees (Combined Criteria 1 and 7). Opportunities for forage production are generally more favorable using even-aged methods (Combined Criteria 3). In Management Area 12, the opportunities to provide young seral stage conditions needed by snowshoe hare, an essential lynx prey animal, in combination with appropriate cover for the lynx, are greatest with even-aged management (Combined Criteria 3). Desired tree growth rates and resistance to future mountain pine beetle epidemics can generally be maintained with greater success using even-aged methods (Schmidt and Alexander 1985) (Combined Criteria 4). Serious dwarf mistletoe problems are locally common in lodgepole pine. Uneven-aged methods will perpetuate this problem and are not applicable in this situation (Schmidt and Alexander 1985) (Combined Criteria 5). In Management Area 12, and to a lesser extent Management Area 14, the transportation system and harvest entry frequency needed for uneven-aged management would greatly increase opportunities for wildlife harassment and for poaching (Combined Criteria 3). For these reasons, even-aged management will be practiced in these management areas.

Management Area 5:

Forest vegetation will be managed in this management area to increase size class diversity and maintain stands in a healthy condition. Here, the stand structure and condition, as well as operational constraints common to Management Areas 1, 12 and 14 will apply. Although both even-aged and uneven-aged methods are biologically possible in healthy stands, even-aged management is strongly favored (Burns 1983). Management here will differ from Management Areas 1, 12 and 14, primarily in scale. Rationale for selection of harvest system and application of selection criteria are the same as in Management Areas 1, 12 and 14 above. Even-aged methods will be applied in this management area.

Management Area 9:

Forest vegetation in this management area will be managed to provide optimum habitat for wildlife. Special conditions for resource management include providing 40% or more cover for big game, openings for quality wildlife forage. Satisfactory tree growth rates should be maintained and trees should be protected from insects, disease and wildfire. While even-aged and uneven-aged methods are biologically possible (Burns 1983), even-aged management will best provide for a mosaic of forest and openings, and for high rates of juvenile tree growth (Combined Criteria 3, 4). Stand structure, condition, transportation system, harvest entry frequency and operational considerations are common with Management Areas 1, 12 and 14. For these reasons, even-aged management will be practiced in this management area.

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Management Area 13:

Forest vegetation in this management area will be managed to provide optimum habitat for wildlife and to maintain the present high quality of water flowing from the forest. Special conditions required to meet management objectives include providing hiding or thermal cover on over 40% of the area, retention of minimum specified amounts of wood debris, and maintaining a high degree of forest canopy cover along streams. Both even-aged and uneven-aged methods are biologically possible in disease-free stands. Transportation system and harvest frequency required for uneven-aged management would increase opportunities for wildlife harassment and increase likelihood of increased sediment reaching streams (Combined Criteria 3). Here, the stand structure, condition and operational considerations are common with Management Areas 1, 12 and 14. Management here will differ primarily in scale. For these reasons, even-aged methods will generally be applied in this management area. Uneven-aged management (group selection) may be applied where site specific analysis determines it best meets managment direction.

Management Area 19:

Forest vegetation in this management area will be managed to provide future optimum habitat for old growth and mature seral stage dependent wildlife. During early portions of the rotation satisfactory growth rates should be maintained. Stands should be protected from injurious insects, disease and wildfire. Optimal stand size is 100 acres or larger. Both even-aged and uneven-aged methods may be biologically possible in healthy, disease free stands. Stand structure, conditions and operational considerations common to Management Areas 1, 12 and 14 will apply. Uneven-aged management will not develop large homogeneous stands desired (Combined Criteria 3). Transportation systems and harvest entry frequency required for uneven-aged management would increase opportunities for wildlife harassment (Combined Criteria 3). For these reasons, even-aged management will be practiced in Management Area 19.

Low Productive Working Group

Management Areas 1, 12, and 14:

Forest vegetation in these management areas will be managed to provide livestock forage, timber and to provide wildlife habitat. Satisfactory growth rates should be encouraged. Both even-aged and uneven-aged methods are biologically possible in specific situations. The selection decision is weighted by shade tolerance, wind firmness and germination requirements of species present, local insect and disease levels, current stand structure, and similar considerations (Combined Criteria 3, 4, 5). Harvestable volumes per acre are generally low. In most situations, the cost of artificial reforestation (planting and similar intensive forestry practices) cannot be recovered over a rotation. Most low productive stands may be accessed in conjunction with transportation systems needed for management of more productive forest lands. Because of low growth rates, harvest entry frequency is low under both even-aged and uneven-aged methods. For these reasons, both even-aged and uneven-aged methods may be practiced. Specific methods will be selected following site specific analysis.

Management Area 5:

Forest vegetation in this management area will be managed to provide visual diversity through variations in stand density and size classes. To the extent biologically and economically possible, large old growth trees will be provided as a stand component. Both even-aged and uneven-aged methods are biologically possible in specific situations. The selection decision is weighted by shade tolerance, wind firmness, and germination requirements of species present, local insect and disease levels, current stand structure and similar considerations (Combined Criteria 3, 4, 5). Harvest volumes per acre are generally low. In most situations, the cost of artificial reforestation and other intensive management practices cannot be recovered over a rotation. Most Low Productive stands may be accessed in conjunction with transportation sytems needed to access more productive lands. Because of low growth rates, harvest entry frequency is low under both even-aged and uneven-aged methods. For these reasons, both even-aged and uneven-aged methods may be practiced. Specific methods will be selected following site specific analysis.

Management Areas 9, 11:

Forest vegetation will be managed to provide optimal Wildlife habitat to the extent biologically and economically possible. In conjuncton with surrounding more productive stands, stands will be managed to provide cover, up to 40% or more when biologically possible. Both even-aged and uneven-aged management may be biologically possible in specific situations. The selection decision is weighted by shade tolerance, wind firmness, and germination requirements of species present, local insect and disease conditions, current stand structure and similar considerations. Harvestable volumes are generally low. In most cases, the costs of artificial reforestation and other intensive management costs cannot be recovered over a rotation. Many Low Productive stands may be accessed in conjuncton with transportation systems needed for more productive forest lands. Because of low growth rates, harvest entry frequency for both even-aged and uneven-aged management is low. For these reasons, both even-aged and uneven-aged methods may be practiced. Specific methods will be selected following site specific analysis.

Management Areas 13, 19:

Forest vegetation will be managed to provide optimal habitat for wildlife and to protect existing high water quality. To the extent feasible, satisfactory growth rates should be encouraged. Both uneven-aged and even-aged methods are biologically possible in specific situations. The selection decision is weighted by relative shade tolerance, wind firmness, and germination requirements of specific species present. Local insect and disease levels, current stand structure and operational requirements must also be considered. Harvestable volumes are low. In most stands the costs of intensive practices such as artificial reforestation cannot be recovered over a rotation. Most Low

Productive stands may be accessed in conjunction with transportation networks serving adjacent more productive forest lands. Because of low growth rates, harvest entry frequency in both even-aged and uneven-aged systems is low. For these reasons, either even-aged or uneven-aged methods may be practiced. Specific methods will be selected following site specific analysis.

Bibliography

Alexander, R. R. et al. Silvical Characteristics of Engelmann Spruce. Gen. Tech. Rpt. RM-114, USDA-FS, Rocky Mtn. For. and Rng. Exp. Sta., 1984.

Alexander, R. R. et al. Silvical Characteristics of Subalpine Fir. Gen. Tech. Rpt. RM-115, USDA-FS, Rocky Mtn. For. and Rng. Exp. Sta., 1984.

Barrett, J. W. 1979. Silviculture of Ponderosa Pine in the Pacific Northwest: the State of our Knowledge. USDA-FS Gen. Tech. Rpt. PNW-92, PNW For. and Rng. Exp. Sta., Portland, OR, 106 p.

Burns, Russell, M. (Tech. Compiler). Silvicultural Systems for the Major Forest Types of the United States. USDA Forest Service, Ag. HB No. 445, Revised December 1983.

Carlson, Clinton E. et al. The Western Spruce Budworm in Northern Rocky Mountain Forests: A Review of Ecology, Insecticide Treatments and Silvicultural Practices. Univ. of Montana, Missoula, MT 59812, 1982.

Diseases of Pacific Coast Conifers, Ag HB 521, USDA-FS, 1979.

Hadfield, James S. and David W. Johnson. Laminated Root Rot - A Guide for Reducing and Preventing Losses in Oregon and Washington Forests. USDA-FS, Pacific NW Region, 1977.

Lotan, James E. Regeneration of Lodgepole Pine Forests in the Northern Rocky Mountains. In Proceedings, Management of Lodgepole Pine Ecosystems, Wash. State Univ., Pullman, WA, 1973.

Schmidt, W.C. and R. R. Alexander. Strategies for Managing Lodgepole Pine. P201-210. Ini Bfaumgartner, D.M. ed. Proceedings, Lodgepole Pine: The Species and Its Management. Coop Extension, Wash. State Univ., Pullman, WA. 1985.

Silvics of Forest Trees of the United States, Ag HB 271, USDA-FS, 1965.

Smith, David M. The Practice of Silviculture, Seventh ed., John Wiley & Sons, 1962.

Tinnin, Robert and Donald Knudson. Dwarf Mistletoe and Host Tree Interactions in Managed Forests of the Pacific Northwest. Gen. Tech. Rpt. PNW-111, 1980.

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